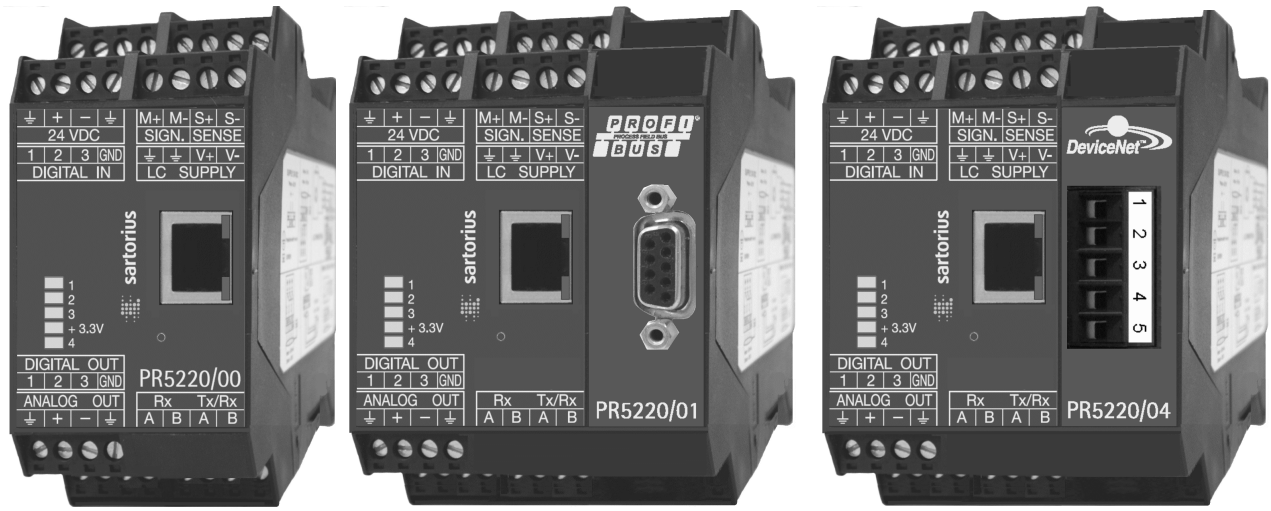
sartorius
mechatronics

Operating Manual

Sartorius
PR 5220 Ethernet Transmitter Series

PR 5220/00 Ethernet Transmitter
PR 5220/01 Ethernet Transmitter with Profibus
PR 5220/04 Ethernet Transmitter with DeviceNet



Operating Manual	9499 050 52201	Edition 1	30.10.2007
for PR 5220	Release: 1.00		

Sartorius Mechatronics T&H GmbH, Meiendorfer Str. 205, 22145 Hamburg, Germany
Tel:+49.40.67960.303 Fax:+49.40.67960.383

Please note

Any information in this document is subject to change without notice and does not represent a commitment on the part of SARTORIUS unless legally prescribed. This product should be operated only by trained and qualified personnel. In correspondence concerning this product the type, name and release number as well as all license numbers in relation to the product have to be quoted.

Bitte beachten

Alle Angaben in diesem Dokument sind - soweit nicht gesetzlich vorgegeben - unverbindlich für SARTORIUS und stehen unter Änderungsvorbehalt. Die Bedienung des Produktes darf nur von geschultem, fach- und sachkundigem Personal durchgeführt werden. Bei Schriftwechsel über dieses Produkt bitte Typ, Bezeichnung und Versionsnummer sowie alle mit dem Produkt in Zusammenhang stehenden Lizenznummern angeben.

Contents

1 Safety Information 7
1.1 Intended Use 7
1.2 Initial Inspection 7
1.3 Before Commissioning 7
1.3.1 Installation 7
1.3.2 Electrostatically Sensitive Components 7
1.3.3 Protective Earth 8
1.3.4 Supply Voltage Connection 8
1.3.5 Failure and Excessive Stress 8
1.3.6 Fuse 8
1.3.7 EMC-Compliant Installation 8

2 PR 5220 Ethernet Transmitter Series 9
2.1 The Transmitter Versions 9
2.1.1 PR 5220/00 Version 9
2.1.2 PR 5220/01 Profibus 9
2.1.3 PR 5220/04 DeviceNet 9
2.2 Overview of the Instrument 10
2.3 Label on the Housing 10
2.4 Housing Dimensions 11
2.5 Operation Using the VNC program 12
2.5.1 Status Symbols 12
2.5.2 Transmitter Keys 12
2.5.3 Navigation Keys, Other Keys 12
2.5.4 Selection Using the Navigation Keys 13
2.5.5 System Messages during Input 14

3 Installing the Instrument 15
3.1.1 Network Port 16
3.2 Connections 17
3.2.1 Load Cell Connection 17
3.2.2 RS-422/485 Interface 19
3.2.3 Analog Output 20
3.2.4 3 Optocoupler Inputs 21
3.2.5 3 Optocoupler Outputs 22
3.2.6 Profibus Interface (PR 5220/01 only) 23
3.2.7 DeviceNet Interface (PR 5220/04 only) 24

4 Controls 25
4.1 Status Indicator LEDs 25

5 Commissioning 26
5.1 Data Backup/Power Failure 26
5.1.1 CAL Switch 26
5.1.2 Factory Settings 26
5.2 Switching on the Instrument 27
5.2.1 Resetting the Instrument, Activating 'DHCP' 27
5.2.2 Searching the Instrument in the Network Using 'IndicatorBrowser' 28
5.3 Operation Using a PC 28
5.3.1 Operation Using the VNC Program 28
5.3.2 Operation Using Internet Browser 29
5.3.3 INFO Function 30
5.3.4 Setup Function (VNC) 31
5.3.5 Setup Menu 31
5.3.6 Calibration Menu 32
5.4 Calibration 33

5.4.1 Displaying Calibration Data 33
5.4.2 Selecting the Calibration Mode 34
5.4.3 Determining the Maximum Capacity (Max) 35
5.4.4 Determining the Scale Interval 36
5.4.5 Determining the Dead Load 37
5.4.6 Calibration with Weight (by Load) 38
5.4.7 Calibration with mV/V Value 39
5.4.8 Calibration with Load Cell Data (“Smart Calibration“) 40
5.4.9 Subsequent Dead Load Correction 41
5.4.10 Linearization 41
5.4.11 Test Value Determination/Display 42
5.4.12 Finishing/Saving the Calibration 42
5.4.13 Parameter Input 43
5.5 Error Messages 46
5.5.1 Measuring Circuit Error Messages 46
5.6 Configuring General Parameters 47
5.6.1 Serial Ports 47
5.6.2 SMA Protocol 48
5.6.3 Operating Parameters 49
5.6.4 Fieldbus Parameters 50
5.6.5 Network Parameters 51
5.7 Limit Values, Digital Inputs and Outputs 52
5.7.1 Conditions for Limit Values and Digital Inputs, States for Outputs 52
5.7.2 Configuring Digital Inputs and Outputs 53
5.7.3 Configuring Outputs 53
5.7.4 Configuring Inputs 54
5.7.5 Configuring Limit Values 56
5.8 Analog Output 58
5.8.1 Adapting the Analog Output 59
5.9 ConfigureIt Professional 60
5.9.1 Installation 60
5.9.2 Starting the Program 62
5.9.3 Establishing the Communication to the Instrument 64
5.9.4 Transferring a Data Set from the Instrument to the PC 65
5.9.5 Saving the Current Data Set on the PC 65
5.9.6 Transferring the Current Data Set or Selected Parameters to the Instrument 67
5.9.7 Resetting the Instrument to Default 67
5.9.8 Exporting a Data Set as a Printable File 67
5.9.9 Operating the Instrument Using the Browser (VNC Program) 68
5.9.10 Closing the Program 68

6 SMA Protocol 69
6.1 General 69
6.2 Description of Used Symbols 69
6.3 SMA Command Set 70
6.3.1 Requesting a Weight 70
6.3.2 Controlling the Scale 71
6.3.3 Scale Diagnosis 72
6.3.4 Scale Data 73
6.3.5 Scale Information 73
6.3.6 Escape Command 73
6.4 SMA Reply Messages 73
6.4.1 Standard Reply 74
6.4.2 Reply with Unknown Command 75
6.4.3 Reply in Case of Communication Error 75
6.4.4 Reply with Diagnosis Command 75
6.4.5 Reply with ‘A’ and ‘B’ Command 76
6.4.6 Scale Reply with ‘I’ and ‘N’ Commands 77
6.5 Communication Error 77

7 Fieldbus Interface 78
7.1 Fieldbus Interface Protocol 78
7.1.1 Write Window (Input Area) 79
7.1.2 Read Window (Output Area) 79
7.1.3 Reading and Writing Data 79
7.2 Description of the I/O Area (Read / Write Window) 80
7.2.1 Input Area 80
7.2.2 Output Area 81
7.2.3 Reading and Writing Register via Fieldbus 82
7.2.4 Example: Reading the Gross Weight 84
7.3 Feldbus Register 85
7.3.1 Register 0: I/O Status Bits for Reading 85
7.3.2 Register 1: Scale Status 85
7.3.3 Register 2: State of State-Controlled Action Bits 86
7.3.4 Register 3: State of Edge-Controlled Action Bits 86
7.3.5 Register 4: Calibration Information, Error Byte 86
7.3.6 Register 5: Device Type and Software Release 87
7.3.7 Register 6: Board Number 87
7.3.8 Register 7: (Reserved) 87
7.3.9 Register 8 ...15: Weight Data 87
7.3.10 Register 22 ... 27: Limit Values (Read/Write) 87
7.3.11 Register 30, 31: Fixed Values (Read/Write) 88
7.3.12 Register 80 ... 89: State-Controlled Action Bits (Write) 88

8 Global SPM Variables 89

9 Configuration Print-Out 91

10 Repairs and Maintenance 92
10.1 Solder Work 92
10.2 Cleaning 92

11 Disposal 92

12 Specifications 93
12.1 Instructions for Use of 'Free Software' 93
12.2 General Data 94
12.2.1 Power Supply 94
12.3 Effect of Ambient Conditions 94
12.3.1 Environmental Conditions 94
12.3.2 Electromagnetic Compatibility (EMC) 94
12.3.3 RF Interference Suppression 94
12.4 Weighing Electronics 95
12.4.1 Load Cells 95
12.4.2 Principle 95
12.4.3 Accuracy and Stability 95
12.4.4 Sensitivity 95
12.5 Mechanical Data 96
12.5.1 Construction 96
12.5.2 Dimensions 96
12.5.3 Weight 96
12.6 Use in Legal-for-Trade Mode 96
12.6.1 Documentation for Verification on the Enclosed CD 96
12.6.2 Additional Instructions 96

13 Index 97

1 Safety Information

The instrument was in perfect condition with regard to safety features when it left the factory. To maintain this condition and to ensure safe operation, the operator must follow the instructions and observe the warnings in this manual.

1.1 Intended Use

The instrument is intended for use as an indicator for weighing functions. Product operation, commissioning and maintenance must be performed by trained and qualified personnel who are aware of and able to deal with the related hazards and take suitable measures for self-protection.
The instrument reflects the state of the art. The manufacturer does not accept any liability for damage caused by other system components or due to incorrect use of the product.

1.2 Initial Inspection

Check the content of the consignment for completeness and inspect it visually for signs of damage that may have occurred during transport. If there are grounds for rejection of the goods, a claim must be filed with the carrier immediately and the Sartorius sales or service organization must be notified.

1.3 Before Commissioning

Visual inspection:
Before commissioning and after and storage or transport, inspect the instrument visually for signs of mechanical damage.

1.3.1 Installation

The instrument is designed for mounting on standard rails (35 mm, acc. to DIN 46277).

When mounting on the rail, please make sure that the distance from other instruments left and right of the module is at least 20 mm.

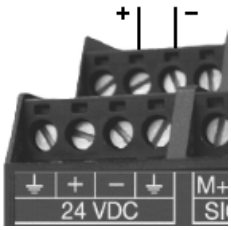
1.3.2 Electrostatically Sensitive Components

This instrument contains electrostatically sensitive components. For this reason, an equipotential bonding conductor must be connected when working on the open instrument (antistatic protection).

1.3.3 Protective Earth

Connection to protective earth must be performed via the mounting rail.

1.3.4 Supply Voltage Connection



The supply voltage is 24V DC +10% / -15%.
Max. power consumption of /00 version: 6.5 W; /01 and /04 version: 8.5 W
For connection to 230 / 115 V AC, an external power supply (e.g. Sartorius PR 1624/00 or Phoenix Mini Power) is required.

1.3.5 Failure and Excessive Stress

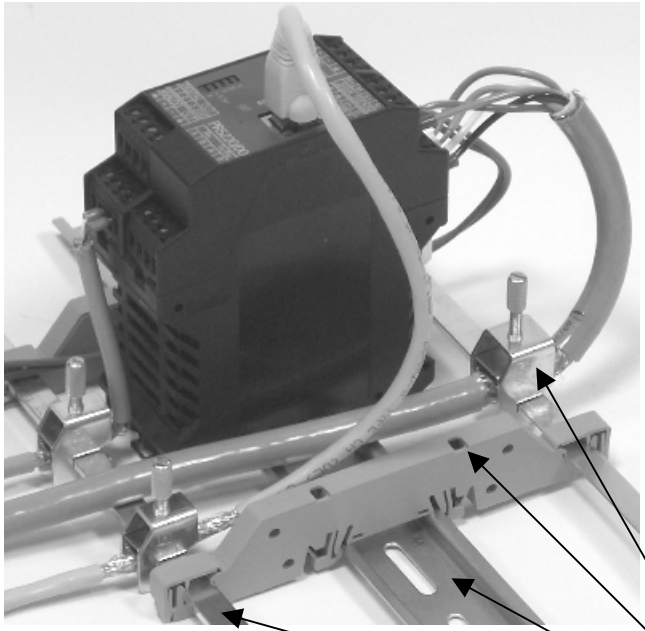
If there is any reason to assume that safe operation of the instrument is no longer ensured, shut it down and make sure it cannot be used. Safe operation is no longer ensured if any of the following is true:

- The instrument is physically damaged
- The instrument does not function
- The instrument has been subjected to stresses beyond the tolerance limits (e.g., during storage or transport).

1.3.6 Fuse

This instrument does not have a replacable fuse. The load cell supply voltage is protected against short circuit. In case of failure of the load cell supply voltage, disconnect the instrument from the supply voltage, determine the cause and take remedial measures. Subsequently, the supply voltage can be switched on again.

1.3.7 EMC-Compliant Installation



- Use only screened data cables
- Connect screens on both ends with ground
- Keep unscreened cable ends short
- Connect screen rail to cabinet / housing with low impedance
- Use metal or metallized connector housings
- Establish equipotential bonding between instruments / system modules (Mandatory for Ex-applications)
- Use standard reference potential
- Connect mounting rail to protective earth
- Install measure and data cables separately from power cables

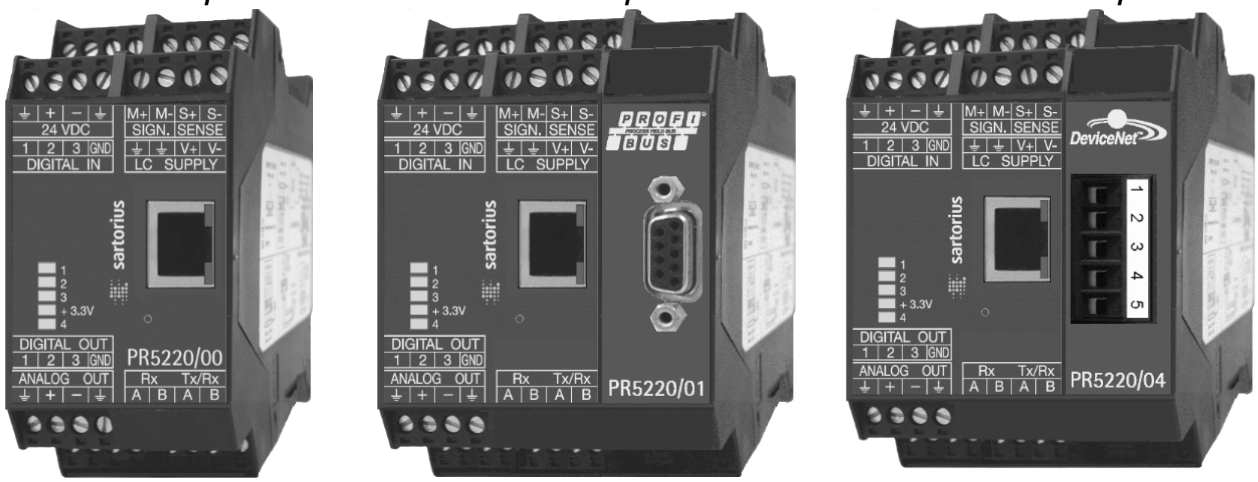
Screen clamp (z.B. Phoenix SK8-D)
Rail connection (z.B. Phoenix AB-SK 65D)
Mounting rail (34mm)
Screen rail (e.g. Phoenix NLS-CU 3/10)

2 PR 5220 Ethernet Transmitter Series

2.1 The Transmitter Versions

Three PR 5220 series transmitter versions are available; subsequent extension of the version is not possible. The version is determined unambiguously by the type number. The front foils are adapted to the version.

PR 5220/00 PR 5220/01 PR 5220/04



2.1.1 PR 5220/00 Version

This version has digital inputs and outputs as well as an analog output and a LAN adaptor for configuration and operation of the instrument. Connecting e.g. a remote indicator is possible via the serial output.

2.1.2 PR 5220/01 Profibus

In addition to PR 5220/00, the instrument is provided with a Profibus port.

2.1.3 PR 5220/04 DeviceNet

In addition to PR 5220/00, the instrument is provided with a DeviceNet port.

2.2 Overview of the Instrument

- EC test certificate / type approval applied for
- Accuracy 10,000 e @ 6 samples/sec
- Internal resolution: 7.5 million counts
- Linearity: < 0.002%
- Sampling rate: 6 ... 100/sec selectable
- Digital filter with selectable characteristic
- Electrically isolated interfaces
- 3 programmable pairs of limit values
- 24 VDC supply voltage connection
- Connection using plug-in terminal blocks
- Socket for LAN adaptor
- Port for Profibus (/01)
- The instrument is provided for snap-on mounting on a standard rail.
- 5 status LEDs für supply voltage, communication, error detection

Calibration and configuration of the instrument are menu guided using a PC, or by Profibus commands (PR 5220/01 only).

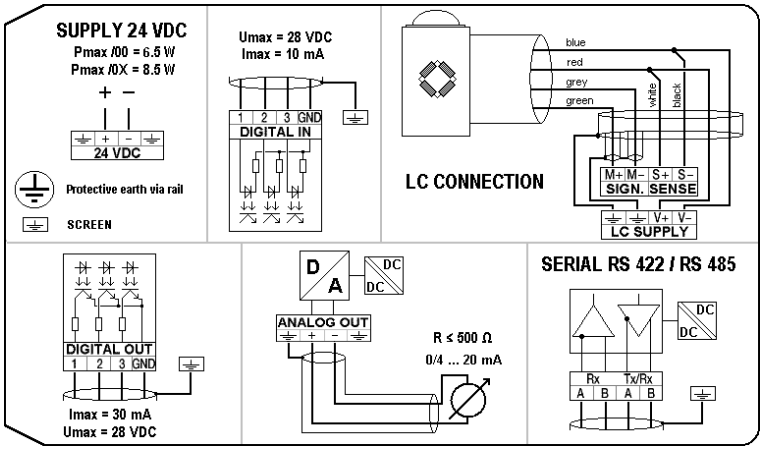
- Calibration with weight, using the mV/V method or with load cell data (“smart calibration”)
- 0/4 ... 20 mA analog output, configurable for gross/net weight
- Analog value via Profibus (PR 5220/01 only)
- 3 digital input channels, electrically isolated
- 3 digital output channels, electrically isolated

Communication protocols:

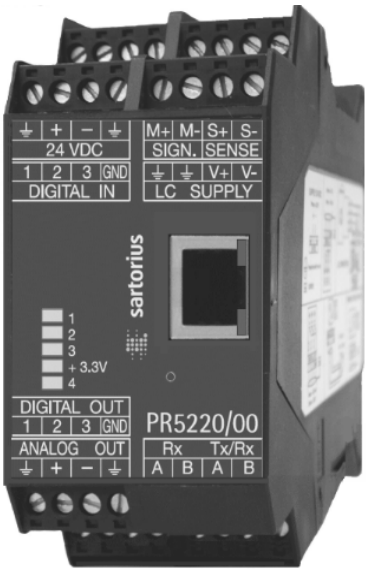
- RS-422 for remote display
- RS-485 for SMA protocol
- Profibus-DP (PR 5220/01 only)
- DeviceNet (PR 5220/04 only)

2.3 Label on the Housing

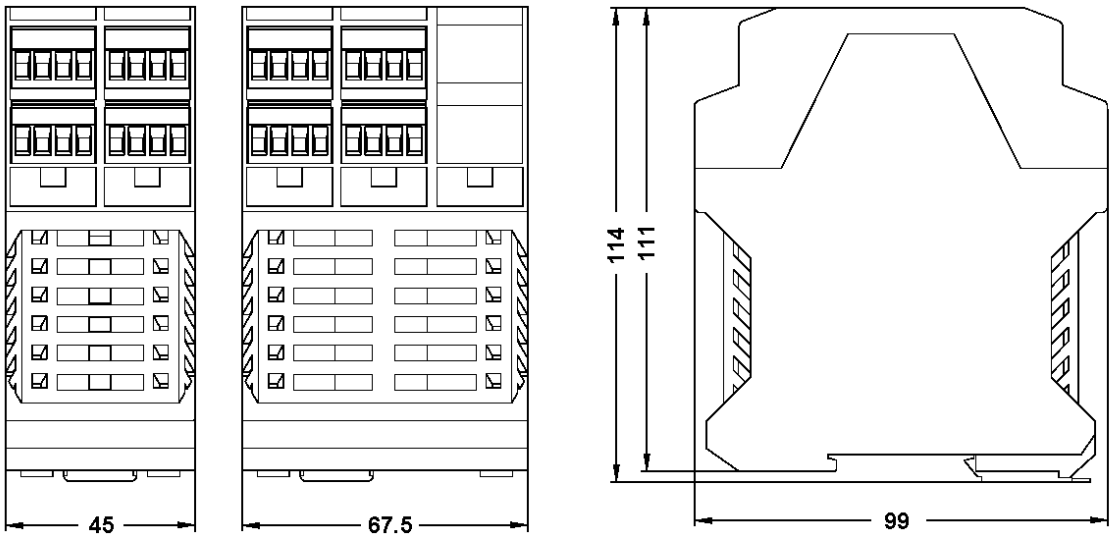
A label with the wiring diagram is located on one side of the instrument:



2.4 Housing Dimensions



PR 5220/00 PR 5220/01, -/04



2.5 Operation Using the VNC program

2.5.1 Status Symbols

B G	Gross weight display (G with NTEP or NSC mode)
NET	Net weight display
T,PT	Tare weight or fixtare display

-0-	The weight value is within +/- ¼ d of zero
	Stability of the weight value

2.5.2 Transmitter Keys

Setup	Instrument settings, set-up
→T←	Taring, the current gross weight is stored in the tare memory, provided that: - weight value is stable - indicator not in error status (function dependent on configuration)
B	Gross weight
T	Tare weight

	Start printing (without function)
→0←	Set gross weight to zero, provided that: - weight value is stable - weight within zero setting range
Test	Analog test, weighing function

2.5.3 Navigation Keys, Other Keys

→	Move cursor right when editing; selection
←	Move cursor left when editing; selection
↓	Scroll down in the menu
↑	Scroll up in the menu
Fn	Function key
Info	Information key

Exit	Exit from current menu
OK	Enter / confirm

2.5.4 Selection Using the Navigation Keys

Press the down arrow key ↓ to scroll down, or the up arrow key ↑ to scroll up in a menu. Press OK to select a menu item. To choose the desired setting for the selected menu item, press ← or → .

Press the Exit key to exit a menu and continue the operation on the next higher level.

An arrow ▸ in front of a menu item indicates that there are menu sublevels. The menu item selected by pressing ↑/↓ is shown inversely.

Info
▸ Show version
▸ Show status

Press the OK key to select an item.

If the list of menu items is long, a vertical bar graph on the left (black and gray) shows which part of the list is displayed.

WP A/Calibration		
Measuretime	⇵	320 ms
Digital filter		off
Test mode		absolute
W & M		none
Standstill time		0.50 s
Standstill range		1.00 d

Availability of settings options (selectable with ← or →) is indicated by preceding double arrows ⇵ .

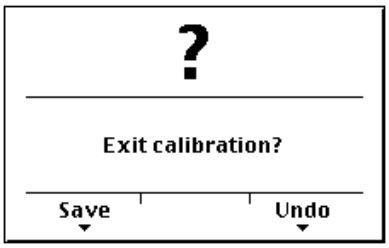
WP A/Calibration		
Measuretime	⇵	640 ms

Press ←/→ to select the measuring time.

2.5.5 System Messages during Input

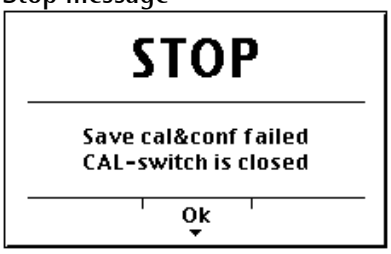
The following types of messages are displayed as confirmation prompts / warnings during input:

Question mark



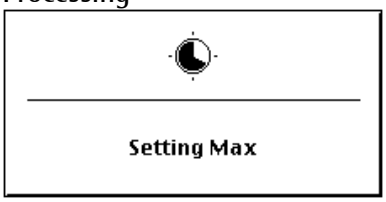
A question mark indicates that a choice of options (e.g. [Save] for saving or [Undo] for cancelling) is available.

Stop message



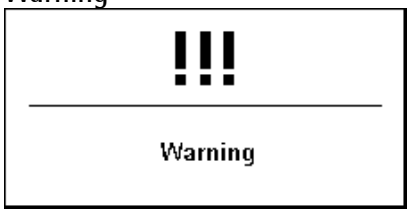
An important indication that an action cannot be executed (e.g., if saving is not possible because the CAL switch is closed). Read the description and press [OK] to continue:

Processing



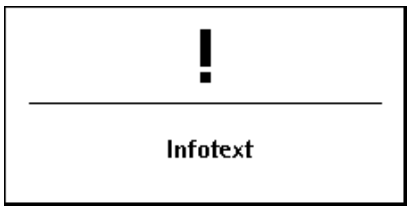
If an action takes a long time (e.g., Max for setting the full scale deflection), a clock symbol is shown.

Warning



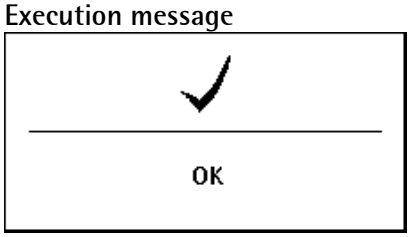
A warning is marked by three exclamation points.

Informational text



An informational text is marked by one exclamation point.

Execution message



Successful execution of an action is indicated by a checkmark.

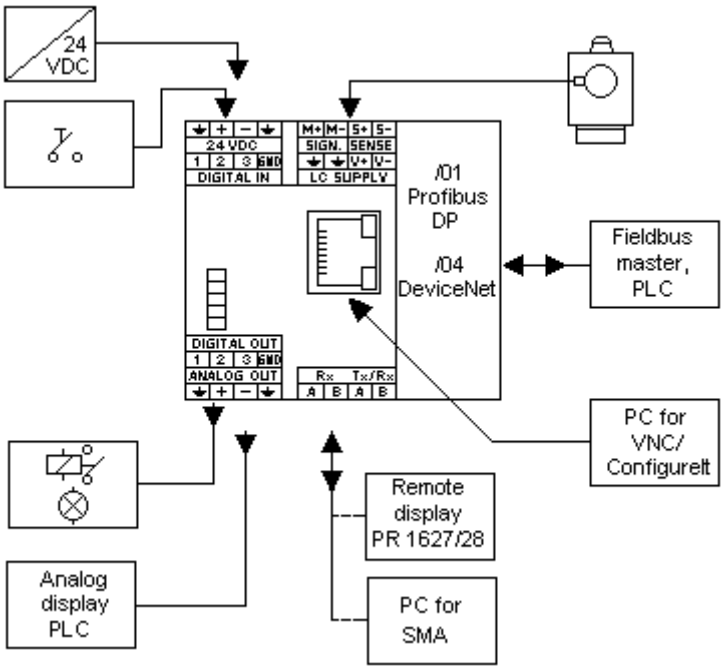
The graphics are not always included when system messages are depicted in this manual.

3 Installing the Instrument

- Before starting work, please read Chapter 1 and follow all instructions.

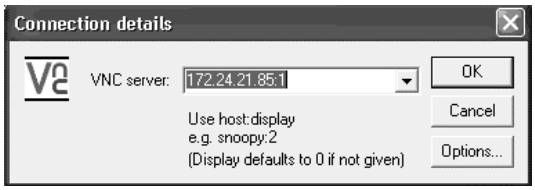
Further procedures:

- Check the consignment: unpack the components specific to the application.
- Safety check: inspect all components for damage.
- Make sure the on-site installation is correct and complete including cables, e.g. power cable fuse protection, load cells, cable junction box, data cable, console/cabinet, etc.
- Follow the instructions for installation of the unit relating to application, safety, ventilation, sealing and environmental influences.
- Connect the cable from cable junction box or platform/load cell.
- If applicable: connect other data cables, network cables, etc.
- Connect the instrument to the supply voltage.
- Check the installation.

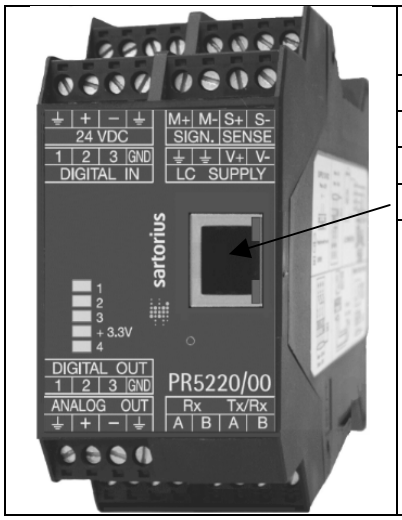


3.1.1 Network Port

The network port is built in as standard equipment. The LEDs on the connector indicate whether the port is functioning.



Remote operation of the instrument from the PC is possible; install VNC program version 3.3.7 on the PC. For setting the network address, see Chapter 5.2.2.



Transfer rate:	10 Mbit/sec, 100Mbit/sec, full/half duplex, auto-detection
Connection method:	Point to point
Cable:	CAT 5 patch cable, shielded twisted pair
Cable impedance:	150 ohms
Connection:	RJ45 socket on top of housing

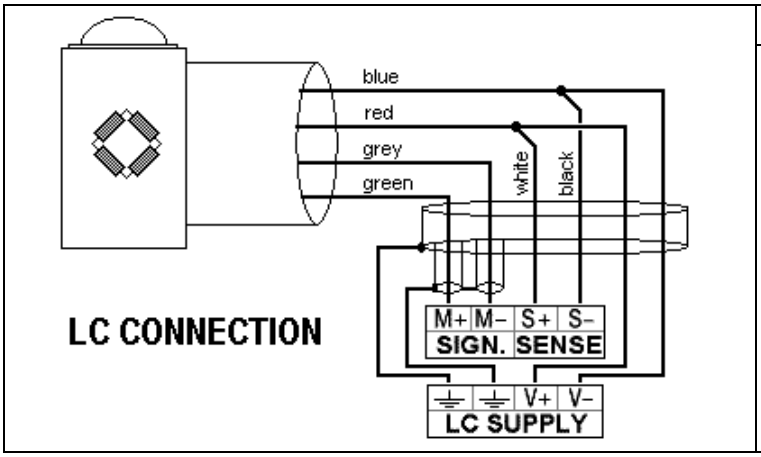
3.2 Connections

3.2.1 Load Cell Connection

⚠	The cable colors shown in this chapter are applicable to the Sartorius PR 62XX series load cells. Before connecting other types, please, carefully follow the information related to the assignment of load cell / platform cable colors.

3.2.1.1 Connection Using 6-Wire Technology

See also label on the housing outside (Chapter 2.3) and manual of the cable junction box.



Terminal	Description
SIGN. M+	+ signal / LC output
SIGN. M-	- signal / LC output
SENSE S+	+ sense
SENSE S-	- sense
LC SUPPLY V+	+ supply / excitation
LC SUPPLY V-	- supply / excitation

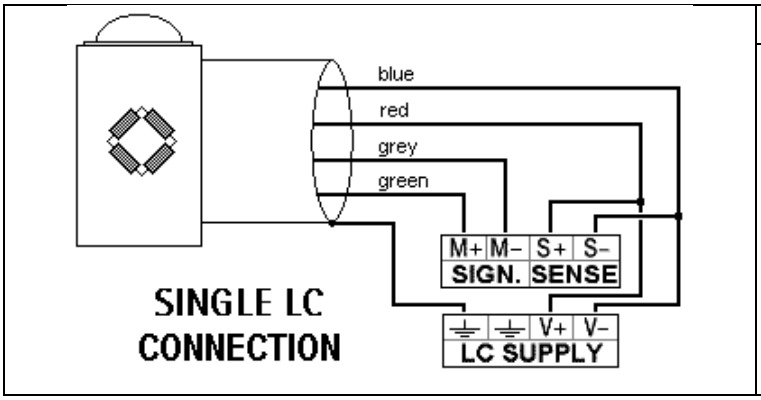
Recommendations:
- Install cable in steel pipe connected to earth potential
- Min. distance to high-voltage cables: 1m

Load cell supply circuit:

The load cell supply voltage is fixed to 12VDC and protected against short circuit
Load resistance of load cells $\geq$ 75 ohms, e.g. 8 load cells of 650 ohms each

3.2.1.2 Connection of a Load Cell in 4-Wire Technology

Note that links between SENSE S+ and LC SUPPLY V+ and between SENSE S- and LC SUPPLY V- directly at the transmitter must be provided.



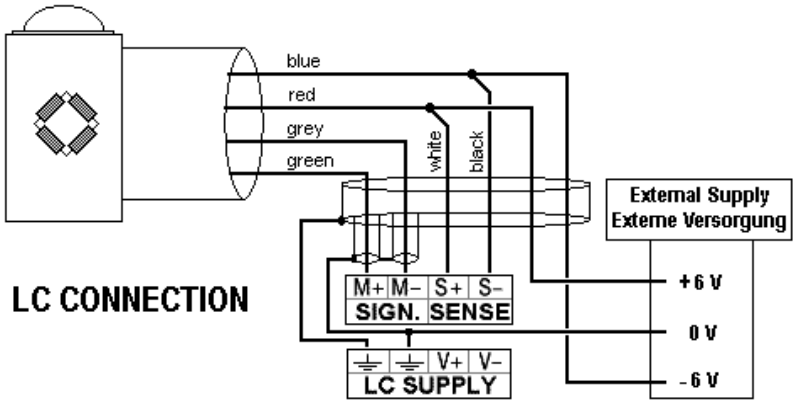
Terminal	Description
SIGN. M+	+ signal / LC output
SIGN. M-	- signal / LC output
SENSE S+	+ sense
SENSE S-	- sense
LC SUPPLY V+	+ supply / excitation
LC SUPPLY V-	- supply / excitation

3.2.1.3 Connecting PR 6221 Load Cells

See PR 6021/08, -/68 operating manual.

3.2.1.4 External Load Cell Supply

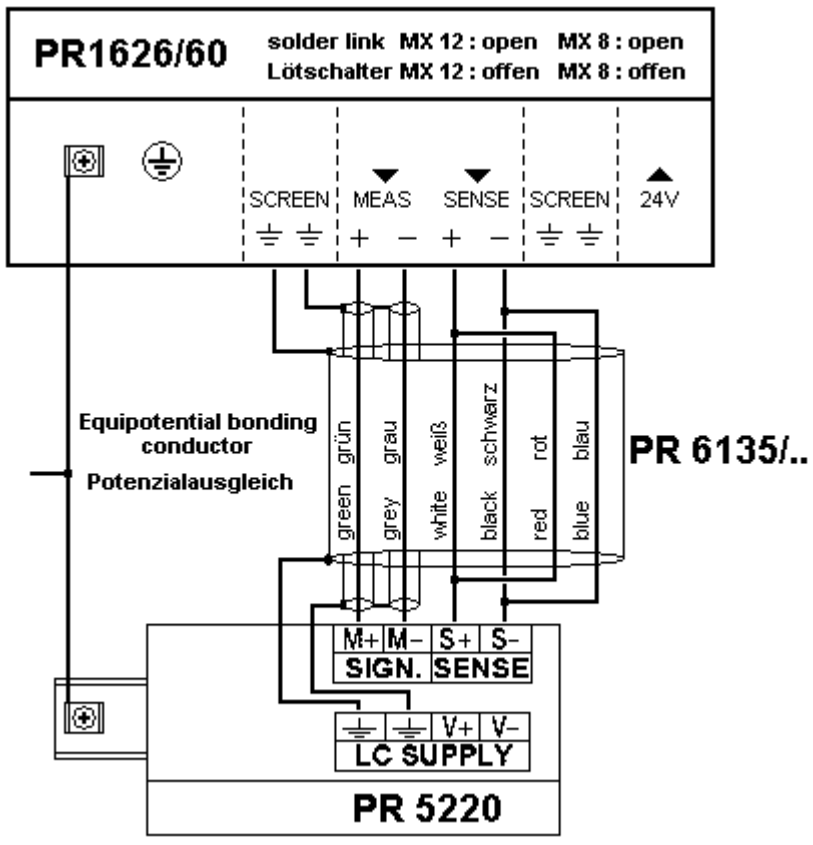
The internal load cell supply voltage of PR5220 (V+, V-) is not connected.
The common line of the symmetrical external supply must be connected to the same terminal of PR 5220 as the shield of the load cell / extension cable.



Specification of external supply: +/- 6 VDC + 5%, -30%; max ripple. 50 mVpp; max. asymmetry +/- 3%. An external supply voltage smaller than 8 VDC (+/- 4 VDC) must be set under Setup-[Calibration]-[Param]-[External supply].

3.2.1.5 Connection via PR 1626/60

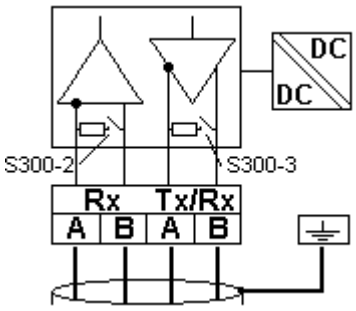
Connect the instrument to PR 1626/60 as described below. For additional connections, refer to the PR 1626/60 manual. The internal load cell supply voltage of PR5220 (V+, V-) is not connected.



If MX8 is closed, [below 8VDC] must be set under Setup-[Calibration]-[Param]-[External supply].

3.2.2 RS-422/485 Interface

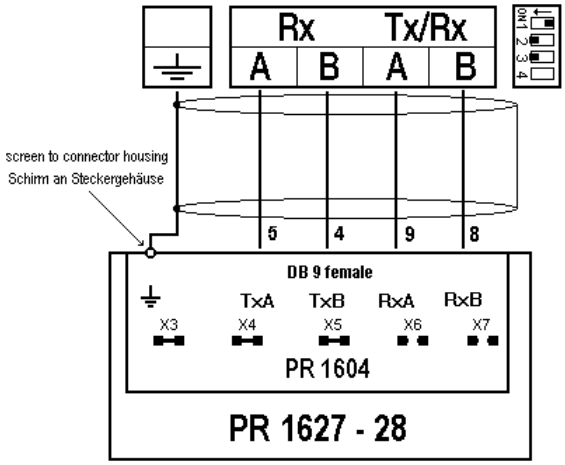
The interface is intended for connecting a PR 1627 type remote display, a PR 1628 terminal or a PC for data transmission using the SMA protocol.



Connection method:	4-pin plug-in terminal block
Number of channels / type:	1 RS-422 / RS-485 , full / half duplex
Transfer rate (Bits/s):	300, 600, 1200, 2400, 4800, <9600>, 19200
Bits / stop bits:	<8 / 1> or 7 / 1
Parity:	<even>, <none>
Signals:	RxA (R-), RxB (R+), TxA, TxB
Electrical isolation:	Yes
Cable length:	Max. 1000m
Cable type:	Shielded twisted pair (e.g. LifYCY 2x2x0.20)

<...> = default settings (factory settings)

Connection of a PR 1627 remote display or of a PR 1628/00, -/60 or -/24 terminal (over the PR 1604 interface)



The following operations are possible from the connected terminal / display:

Test
Set tare
Reset tare
Set zero

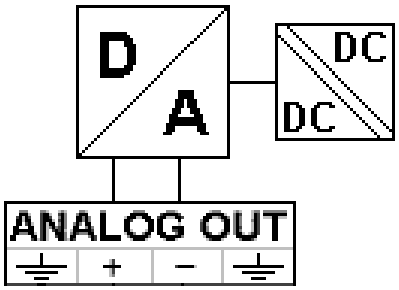
S300

ON <-----
2-wire connection
(d) Receiver terminating resistor 'ON'
(d) Transmitter (rec.) terminating resistor 'ON'
Calibration data and parameters secured

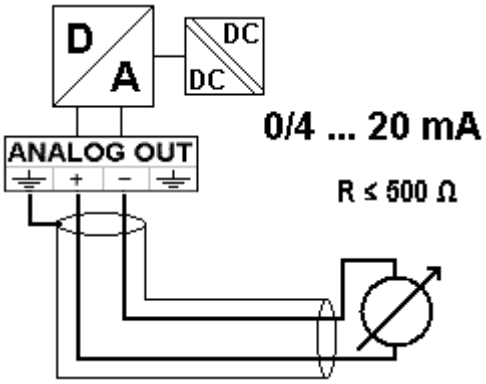
OFF ----->
(d) 4-wire connection
Receiver terminating resistor 'OFF'
Transmitter (rec.) terminating resistor 'OFF'
(d) Calibration data and parameters not secured

(d) - default = factory setting

3.2.3 Analog Output



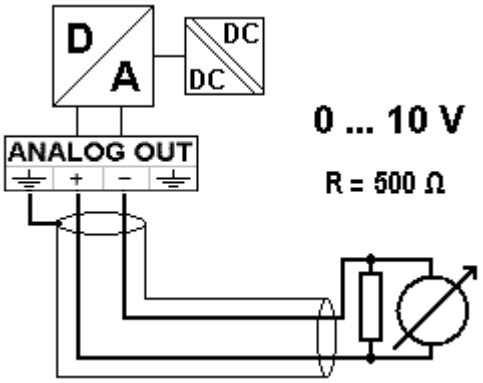
Connection method:	4-pin plug-in terminal block
Number of outputs:	1 current output, output voltage via external resistor
Output:	Gross, net weight or via Profibus
Range:	0/4 ... 20mA, configurable
Resolution:	E.g. 0 - 20 mA in max. 40,000 counts
Linearity error:	@ 0 - 20mA: <0,05 % @ 4 - 20 mA: <0,025 %
Temperature effect:	< 100 ppm/K
Load:	0 ... max. 500 ohms
Protected against short circuit:	Yes
Electrical isolation:	Yes
Cable length (shielded):	150 m (current output)



0/4 ... 20mA

Analog signal,
current output.

The current is supplied directly via the terminals.



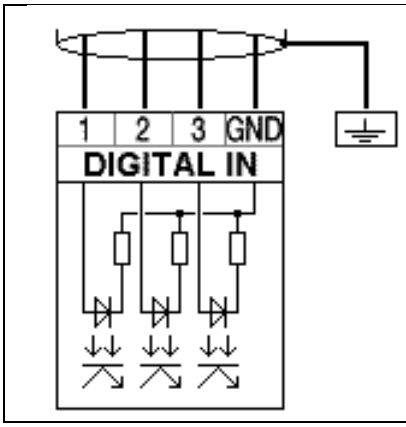
0 ... 10V

Analog signal,
voltage output

The voltage level corresponds to the voltage drop across the 500-ohm- (10 ppm/K) resistor.

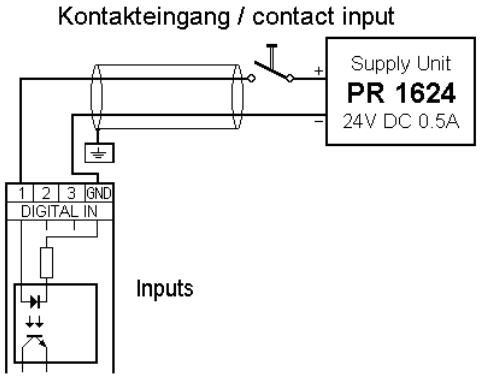
3.2.4 3 Optocoupler Inputs

The optocoupler inputs have one common potential (GND) for the input group that is separated from the common potential of the output group.



Connection method:	4-pin plug-in terminal block
Cable:	Shielded, max. 50 m
Number of outputs:	3
Input signal:	External supply required 10 ... 28 V DC for 'high' level 0 ... 5 V DC for 'low' level
Input voltage:	Max. 28 V DC
Input current:	< 11 mA @ 24 V DC < 5 mA @ 12 V DC
Electrical isolation:	Yes; a common minus potential for the group of 3 inputs

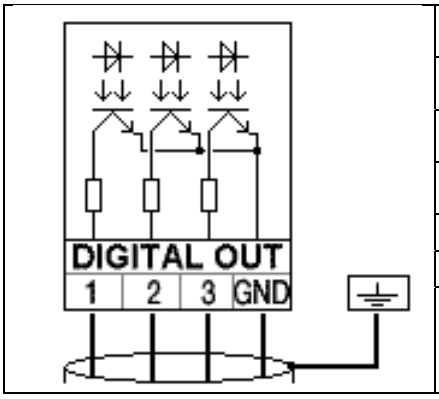
Example: contact input connection



When a voltage >= 10 VDC is applied to the terminals (in the example :1-GND), input 1 is active (true).

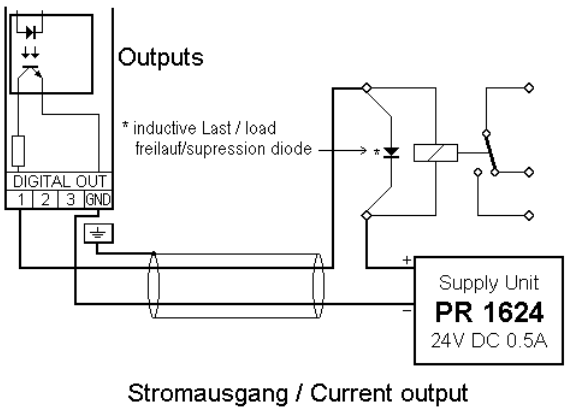
3.2.5 3 Optocoupler Outputs

The optocoupler outputs have one common potential (GND) for the output group that is separated from the common potential of the input group.



Connection method:	4-pin plug-in terminal block
Cable:	Shielded, max. 50 m
Number of outputs:	3
Output signal:	External supply required
Output current:	Max. 30 mA
Output voltage:	Max. switching voltage: 28 VDC
Electrical isolation:	Yes; a common minus potential for the group of 3 outputs

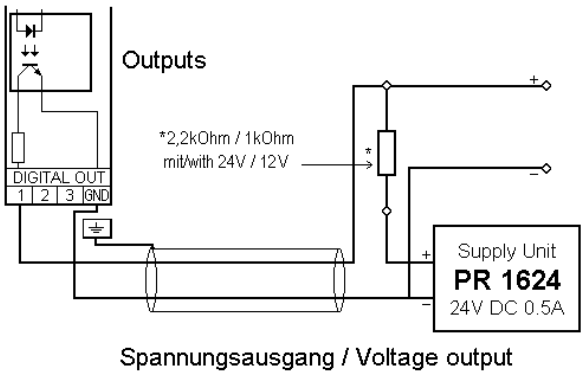
Example: relay control connection



Stromausgang / Current output

When output 1 is active (true), the relay switches. For protection of the output circuit, relays with free-wheel diode must be provided.

Example: voltage output connection



Spannungsausgang / Voltage output

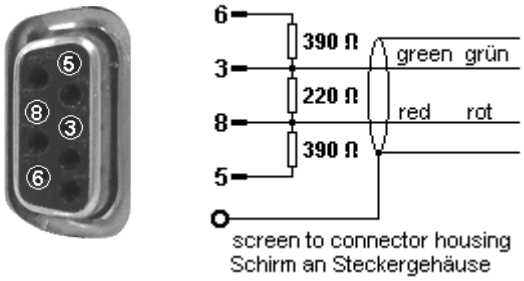
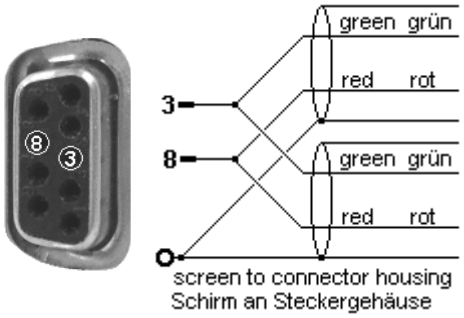
When output 1 is active (true), the output voltage changes from 24 /12 VDC into < 3 VDC. A load resistance of 2.2 /1 kohms must be provided.

3.2.6 Profibus Interface (PR 5220/01 only)

Communication protocols and syntax comply with the Profibus-DP standard to IEC 61158 with transfer rates up to 12 Mbit/s.

Transfer rate:	9.6 kbit/s to 12 Mbit/s, baud rate auto-detection
Protocol:	PROFIBUS-DP-V0 slave to EN 50 170 (DIN 19245), mono or multi-master systems are supported. Master and slave devices, max. 126 nodes possible. Watchdog timer
Transport:	EIA RS-485 , Profibus DIN 19245 Part 1
Cable:	Profibus special colour: violet Shielded twisted pair cable
Cable impedance:	150 ohms
Certificates:	Profibus test center Comdec in Germany and PNO (Profibus User Organization). Suitable for industrial applications to CE, UL and cUL
Electrical isolation:	Optocoupler in lines A and B (RS-485)
Cable length:	Max. distances 200m can be extended with 1.5 Mbit/s by means of additional repeater

Connection to the Profibus is using the 9-contact plug-in socket on the front panel.

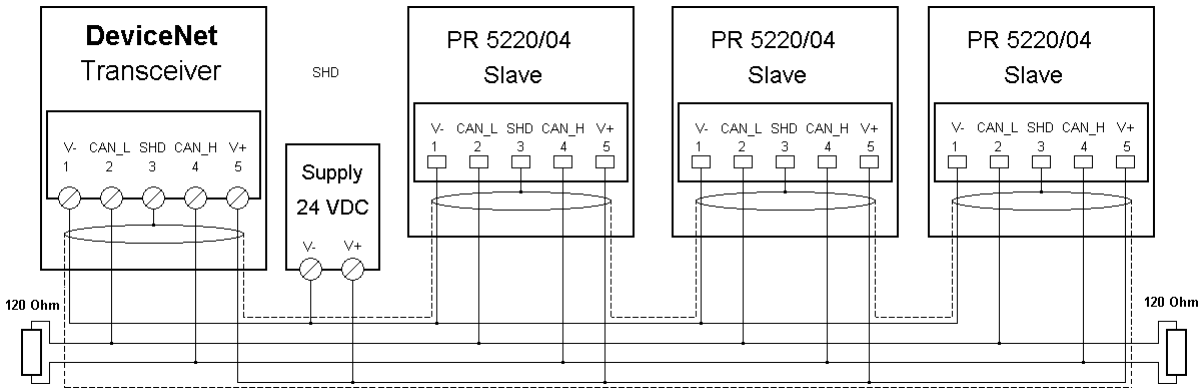
The transmitter is the only or last slave on the bus	The transmitter is not the only or last slave on the bus	PIN	Signal
		3 4 5 6 8	RxD/TxD-P CNTR-P DGND VP RxD/TxD-P

3.2.7 DeviceNet Interface (PR 5220/04 only)

It is a complete DeviceNet adapter (SLAVE) with CAN controller and transfer rates of up to 500 kbit/s.

Connection:	5-contact screw terminal block (plug-in)
Transfer rate:	125, 250 and 500 kbit/s
Topology:	Parallel bus
Protocol:	DeviceNet master/slave Polling method (polled I/O) CRC error detection to IEC 62026 (EN50325) Max. 64 station nodes Max. data width 512 bytes input & output
Transport:	EIA RS-485
Configuration:	EDS file MAC-ID (1...62)
Certificates/ conformity:	Compatible with DeviceNet specification Vol 1: 2.0, Vol 2: 2.0 ODVA certificate in accordance with conformity test software version A-12 Suitable for industrial applications to CE, UL and cUL
Cable:	DeviceNet, color: petrol-green 2x2 shielded twisted pair
Cable impedance:	150 ohms
Bus termination:	120 ohms at the cable ends
Electrical isolation:	Yes, optocoupler and DC/DC converter

Connecting diagram for a master with three slaves



4 Controls

4.1 Status Indicator LEDs

The instrument has 5 green LEDs for indication of the operating or error status.

Power supply, bus connection

	Power on	Bus	Bus connection not provided
1			
2			
3			
+ 3.3V	lit		
4		lit	blinks 1 Hz

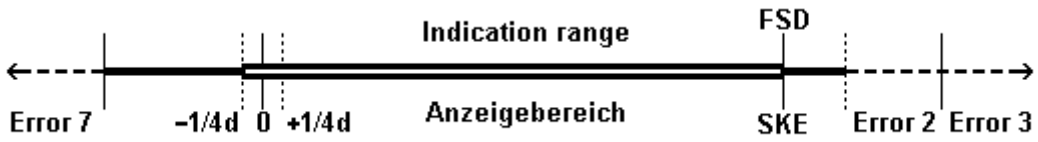
* The LED for the bus activity (PR 5220/01 a. PR 5220/04) is lit as soon as there is a connection. It continues being lit, also when there is no communication, or when the physical connection is cut.

Weight status indicator LED

	Standstill	Center zero	Below zero or above max. capacity
1	lit		
2		lit	
3			lit
+ 3.3V			
4			

Weight error status:

	Error 1 Arithmetic	Error 7 (negative)	Error 2 Overload	Error 3 (> 36 mV)	Error 6 Sense monit.
1	blinks 1 Hz	blinks 1 Hz			Alternate bl. 1Hz
2	blinks 1 Hz			blinks 1 Hz	Alternate bl. 1Hz
3	blinks 1 Hz	blinks 1 Hz	blinks 1 Hz	blinks 1 Hz	Alternate bl. 1Hz
+ 3.3V					
4					



5 Commissioning

The meaning of indicator LEDs and the operating concept are described in Chapter 4.

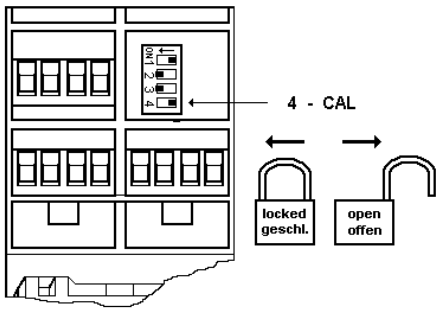
5.1 Data Backup/Power Failure

The calibration data and parameters as well as all configuration and interface data are stored in a non-volatile (EAROM) memory. Unauthorized data changing can be prevented by an access code. Additional write protection is provided for calibration data and parameters (CAL switch, see Chapter 5.1.1).

5.1.1 CAL Switch

The CAL switch protects the calibration data / parameters against unauthorized access.

When the CAL switch is in 'open' position, the calibration data and parameters can be changed using the PC program or via the Profibus connection.
With the CAL switch in the 'closed' position, the calibration data (e.g. dead load, Span) and Parameters (e.g. measure time, zero tracking etc.) cannot be changed.



The CAL switch is located under a cover that can be opened by means of a knife.

For 'legal-for-trade' applications, set the CAL switch (4) to the left position and seal the cover.

5.1.2 Factory Settings

Calibration data <default>	Calibration data <default>
Full scale (Max) <3000> <Kg>	Measure time (M) <320>ms
Scale interval <1>	Measuring rate <160>ms
Dead load <0.000000>mV/V	Standstill time <1>M
Span <1.000000>mV/V	Standstill range <1.00>d
	Tare timeout <8>M
Calibration parameters <default>	<Absolute> test mode
Overload (range above Max) <9>d	Zero-setting range <50.00>d
* W & M mode <off>	Zero-tracking range <0.25>d
Filter <off>	Zero-tracking step <0.25>d
Frequency <1.56 Hz>	Zerotrack repeat <0>M

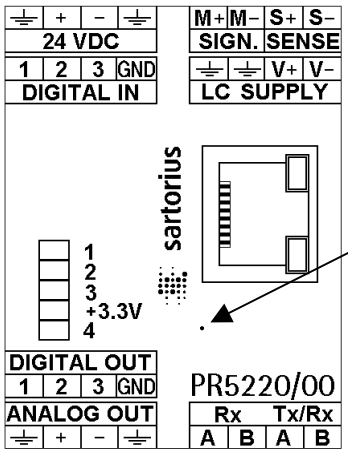
* Parameter W&M must be set to 'on' or 'off' prior to input of the calibration data, see Chapter 5.4.13.1.

.

5.2 Switching on the Instrument

The instrument can be put into operation and calibrated using a PC with the VNC program (on the CD packed with the instrument), an Internet Browser or the ConfigureIt program.

5.2.1 Resetting the Instrument, Activating 'DHCP'



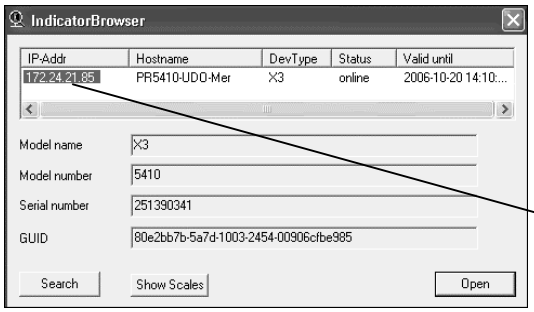
The instrument can be reset using a pin with a diameter of 1.0 mm (e.g. paper clip).

By actuating during approx. 1 second, the program is re-started.
When actuating during approx. 3 seonds, 'DHCP' is activated in the instrument (independent of the previous settings). This ensures that a valid address for identification of the instrument in the network can be assigned to the instrument by a server.

5.2.2 Searching the Instrument in the Network Using 'IndicatorBrowser'

The address can be determined using the 'IndicatorBrowser' (in a directory on the CD-ROM packed with the instrument) program.

Install and start the 'IndicatorBrowser'.

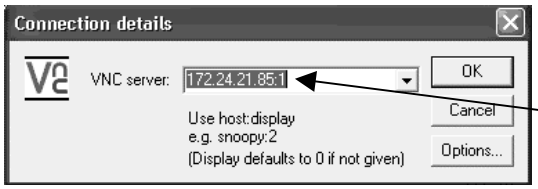


When the instrument is connected to a network, it is "default" in the DHCP mode, i.e. an address is assigned to it by the server. This address, e.g. 172.24.21.85, can be determined using the 'IndicatorBrowser' program.

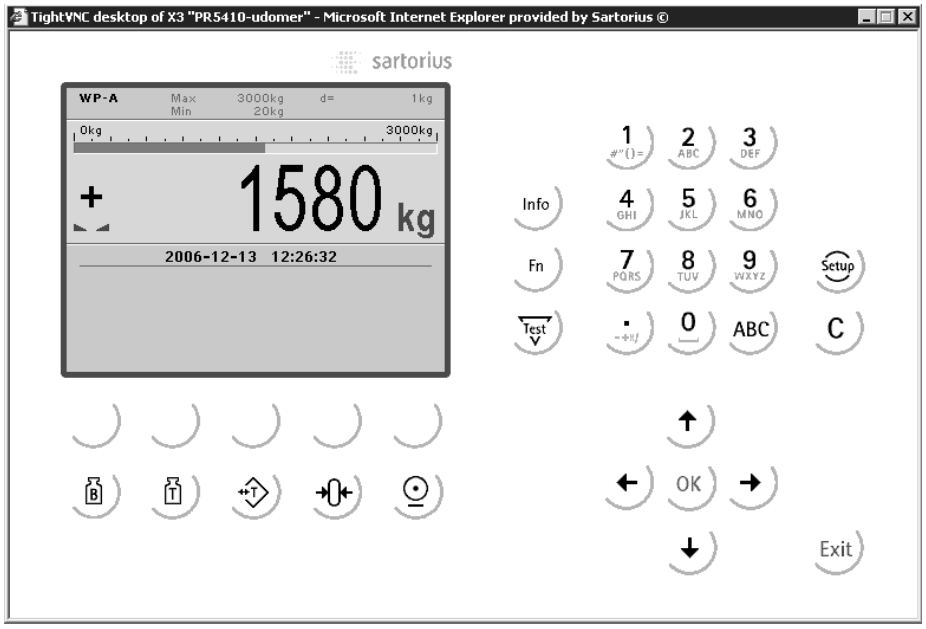
5.3 Operation Using a PC

5.3.1 Operation Using the VNC Program

VNC stands for 'virtual network computing' and is a program for remote operation of computers.
The program distinguishes between the VNC server and VNC client (viewer). The server program is part of the instrument software. The client program (viewer) must be installed and executed on the PC to be used for operating the instrument.



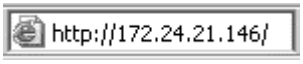
For direct operation using the VNC program, the IP address (extended by :1) must be specified when you run the program, e.g. 172.24.21.85:1.



The address range of the controlling PC can be limited in the instrument; see Chapter 5.6.5.
The operator interface of the VNC program appears:

5.3.2 Operation Using Internet Browser

With the Internet browser, the [IP address] must be filled in.

Example: 

PR5220 Ethernet Transmitter
(PR5220-udomer)

- Remote Configuration (VNC)
- Remote control (VNC) Popup Window
- Indicator
- Indicator Popup Window
- Configuration Printout
- Logfiles
- Screenshot
- Show error Log

[Remote Configuration (VNC)], [Remote Configuration (VNC) Pop up Window]
For instrument operation using the VNC program without additional installation of VNC, see Chapter 5.3.1 .

[Indicator], [Indicator Pop up Window]

The weight value is displayed with the unit and status symbols.

[Configuration Printout]
Can be used for printing the configuration data as a text file.

[Logfiles]

[Screenshot]
Device display for saving the display

[Show error Log]
Display of the error messages

5.3.3 INFO Function

When you press (Info), the program releases and status messages are displayed. The (Info) key also has other functions; see Chapters 5.4.1.1 and 5.4.9.

Info
▸ Show version
▸ Show status
▸ Show HW-slots

For operation, see application manual.

When you select [Show version], the installed program releases and the board number are displayed:

Info/Version		
Firmware	Rel. 01.00.00	Firmware release and creation date
	2006-12-02 10:50	
Appl-DEFAULT	Rel. 01.00.00	Application release and creation date
	2006-12-02 10:50	
Bios	Rel. 01.00.00	BIOS release and creation date
	2006-12-02 10:50	
Boardnumber	251398426	Main board identification number (different from the device serial number)

When you select [Show status], instrument status information is displayed:

Info/Status		
Free system RAM	6328 of 15212 kb	
CAL-Switch	closed	(opened if CAL switch is open)

When you select [Show HW-slots], the installed plug-in cards are displayed:

Info/HW-Slots			
▸	Builtin	RS 232	Standard serial interface
▸ Slot 1	PR 5510/04	RS 485/232	
▸ Slot 2		-empty-	
▸ Slot 3	Builtin	Digital I/O	Standard interface, digital I/Os
▸ Slot 4		Profibus-DP	

5.3.4 Setup Function (VNC)

Press Setup to configure the main operating parameters. The instrument configuration depends on the application and the plug-in cards installed.
Calibration is in a simple dialogue. Compliance with the relevant (verification) standards must be checked by the person commissioning the instrument or the verification officer. To protect the calibration data from overwriting, close the CAL switch on the back panel of the instrument. On legal-for trade instruments, the CAL switch must be sealed in the closed (write-protected) position; see Chapter 5.1.1.

5.3.5 Setup Menu

Setup

- Serial ports parameter	
- Remote display	<none>, Builtin RS232
- SMA	not used <none>, Builtin RS232, Slot 1 .. 2 RS485, Slot 1 ... 2 RS 232
- Param	Builtin RS232, Assigned to, Protocol, Baud rate., Bits, Parity, Stop bits,
- Operating parameter	
- AccessCode	Access code for changes
- SetTareKey	Tare&reset tare, tare&tare again, disabled
- SetZeroKey	Only when not tared, reset tare on zeroset , disabled.
- Fieldbus parameter	Only for PR 5220/01 and /04, see Chapter 5.6.4
- Network parameter	Hardware address (read only), Instrument name, IP address, Subnet mask, Standard gateway, VNC-Client (access restriction)
- Calibration	New, Modify, Param, see Chapter 5.3.6
-Limit parameter	
- Limit 1/2/3 on/off	Limit 1/2/3 'on'/ 'off', Action, Condition; see Chapter 5.7.5
-Digital I/O parameter	
- Output 1/2/3	Configuring outputs; see Chapter
- Limit 1/2/3 on/off	Inputs, Action, Condition; see Chapter 5.7.4
- Analog output parameter	Gross, Net, Select, Transparent; see Chapter 5.8

5.3.6 Calibration Menu

- Calibration	Calibration of weighing electronics
- New	
Reset Span and deadload	Contin, Cancel
- Max	0.00001 ...<3000>... 999999 <kg>, t, lb, g
- Scale interval	<1>, 2, 5, 10, 20, 50
- Deadload at	<0.000000 mV/V> or [by load]
- Max at	<1.000000 mV/V> or [by load]
by load	0.00001 ... 999999 <kg>, t, lb, g
- Calibrated at	(Display only)
- Sensitivity (µV/d)	(Display only)
- Test	Determine test value
Exit calibration	Save or cancel changes
- Modify	Only for minor modifications/ setting new dead load, otherwise [New
see New	
- Param	
- Measuretime	5 ms, 10, 20, 40, 80, 160, <320>, 640, 960, 1280, 1600ms
- Digital filter	<off>, Bessel, aperiod., butterw., tscheby.
- External supply	<8 -12 VDC>, below 8 VDC
- * Fcut	Cut-off frequency, only unless filter 'off', 0.1 - 80.0 Hz
- Test mode	<Absolute>, relative
- W & M	<none>, OIML, NSC, NTEP
- Standstill time	0.01 s…<0.50 s> ... 2.0 s (range is dependent on response time)
- Standstill range	0.00 d ... <1.00 d> ... 10.00 d
- Tare timeout	0.1 s ... <2.5 s> ... 25 s, timeout due to instability
- Zeroset range	0.00 d ... <1.00 d> ... 10.00 d
- Zeroset range	0.00 d ... <1.00 d> ... 10.00 d
- Zerotrack step	0.00 d ... <1.00 d> ... 10.00 d
- Zerotrack time	<0.0 s> ... 25 s
- Overload	0 d ... <9 d> ... 999900 d
- Min	0 d ... <50 d> ... 999900 d, minimum weight
- Range mode	<Single range>, multiple range, multi-interval
- * Range limit 1	In weight, unit same as Max, transition from small to medium scale interval, *only for multiple range or multi-interval
- * Range limit 2	In weight, unit same as Max, transition from medium to high scale interval, *only for multiple range or multi-interval
- View(when - View(when CAL switch closed)	
- Max	(Display only)
- Scale interval	(Display only)
- Deadload at	(Display only)
- Max at	(Display only)
- Calibrated at	(Display only)
- Sensitivity (µV/d)	(Display only)
- Param	Items as for Param. (display only)

5.4 Calibration

Calibration using weights, mV/V or load cell data can be done using the VNC program. During calibration, the instrument must be set to gross weight display (reset tare, if necessary).
For a 'legal-for-trade' application, set the mode under Setup-[Calibration]-[Param] to [W&M] before starting calibration; see Chapter 5.4.13.1. Select [New] to go to the maximum capacity [Max] (see chapter 5.4.3), select the scale interval and determine the dead load. Now calibrate the maximum capacity by applying a calibration weight, in mV/V or with load cell data. After determining the test value, the menu can be closed as described in Chapter 5.4.12, in order to save the new settings. Calibration data can be protected by the CAL switch (see Chapter 5.1.1), which must be sealed in the closed (write-protected) position for 'legal-for-trade' applications.

5.4.1 Displaying Calibration Data

Cannot calibrate! CAL_switch is closed	When the CAL switch is closed, the following message is displayed; only data display possible with [Param]:

Cannot calibrate! Scale is tared	If the scale was tared, the following message is displayed, data display with [View], reset tare with [Res.tar.], return with [Cancel]:

With [View], the calibration data can be displayed, but not changed.

WP A/View Calibration			
Max	3000 d	3000 kg	Number of scale intervals and max. capacity
Scale interval	3000 d	1 kg	Scale interval
Deadload at	0.00 kg	0.000000 mV/V	Dead load in weight and mV/V
Max at	3000.00 kg	1.000000 mV/V	Weight and mV/V for maximum capacity
Calibrated at	3000.00 kg	1.000000 mV/V	Test load* and corresponding mV/V
Sensitivity	833.33 counts/d	4.000000 µV/d	Number of internal counts and voltage per scale interval
Param			

The calibration data and parameters (press [Param]) are displayed in the format entered/determined during calibration.
* After input with mV/V, the maximum capacity and the mV/V value entered are displayed.

5.4.1.1 Increased Resolution (10-Fold)

In the Setup-[Calibration] menu, the weight is displayed with 10-fold resolution (also with the CAL switch closed) when you press the key Info, and marked as an invalid weight with ⚠ above the weight unit. After 5 s, the display returns to normal resolution, or you can press the key ↓ to return to normal display immediately.

5.4.2 Selecting the Calibration Mode

You can choose between [New] and [Modify] with the softkeys:

New	Modify	Param		

5.4.2.1 New Calibration

Open the menu via Setup-[Calibration].
When you press [New], the data is set to default first and calibration is started.

SPAN and deadload will be reset

You are prompted to confirm.
Press [Continue] for the default settings, or [Cancel] to cancel the selection.

Default settings with [New]:

WP A/Calibration				
Max	3000 d		3000 kg	
Scale interval	3000 d		1 kg	
Deadload at			0.000000	mV/V
Max at			1.000000	mV/V
Not calibrated				
Sensitivity	833.33	cnt/d	4.000000	µV/d
				Test

5.4.2.2 Changing the Calibration

[Modify] may be used only for minor changes (e.g. changing the dead load, adapting mV/V values for dead load and/or Max); otherwise, always use [New].

Open the menu via Setup-[Calibration]-[Modify].

WP A/Calibration				
Max	3000 d		3000 kg	
Scale interval	3000 d		1 kg	
Deadload at	1.07 kg		0.000358	mV/V
Max at	3000.00 kg		1.000000	mV/V
Calibrated at	3000.00 kg		1.000000	mV/V
Sensitivity	833.33	cnt/d	4.000000	µV/d
by load	by mV/V			Test

For setting a new value for Dead load, press ↑/↓ to select [Deadload] and either enter a new mV/V value with [by mV/V] or discharge the scale/hopper and press [by load].

Exit calibration without CalcTest?

When closing the menu with Exit you are prompted whether the menu should be closed without calculation of the test value:
Reply [Yes] to close the menu.

5.4.3 Determining the Maximum Capacity (Max)

The maximum capacity (Max) determines the maximum weight without dead load of the weight to be measured and the displayed number of digits behind the decimal point. Normally, Max is less than the load cell capacity (nominal capacity x number of load cells).
Permissible values are:
[Max] from 0.00010 to 999999, with ABC in kg, t, g or lb
Max must be an integer multiple of the scale interval. It may have up to 6 digits and is entered as a numeric value with or without decimal point.

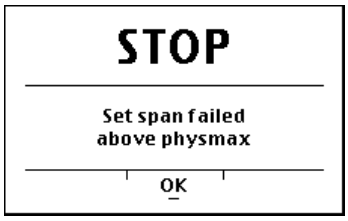
WP A/Calibration		
Max	3000 d	3000 kg

The weight unit can be changed from kg into t, g or lb by pressing ABC.

After pressing OK or ↓ confirmation of the change is displayed with:

Setting Max

Error messages



The maximum capacity is too high (the calculated input voltage for the specified maximum capacity exceeds 36 mV).

Set Max failed below calibration	Subsequent changing of the maximum capacity is possible; if you decrease the capacity, a message is displayed if the new maximum capacity is lower than the test load ([Calibrated at]):
Set Max failed too many digits	The selected resolution is so high that less than 0.8 internal counts per scale interval (d) or 0.5 µV/e for legal-for-trade acc. to OIML/NSC are available.
Set Max failed Max not multiple of scale interval	The maximum capacity is not an integer multiple of the scale interval.
Set Max failed incompatible units	Weight units do not match, e.g. subsequent change of [Max] from kg to lb

After you press [OK], the input value for the maximum capacity is canceled.

5.4.4 Determining the Scale Interval

WP A/Calibration			
Max	3000 d		3000 kg
Scale interval	3000 d	⇵	1kg

The scale interval
1, 2, 5 10, 20 or 50 can be set by pressing ← / → .

The weight unit is taken from [Max] and cannot be changed here.
The number of digits behind the decimal point must be determined already when entering [Max] as well.

Set Scale interval

After pressing OK or ↓ confirmation of the change is displayed with:

Set scale interval failed **Max not multiple of scale interval**

The maximum capacity is not an integer multiple of the scale interval.

5.4.5 Determining the Dead Load

WP A/Calibration			
Max	3000 d	3000 kg	
Scale interval	3000 d	1 kg	
Deadload at	0.00 kg	0.000000	mV/V
Max at	3000.00 kg	1.000000	mV/V
Not calibrated			
Sensitivity	833.33 d/mV	4.000000	µV/d
by load	by mV/V		Test

To use the empty scale/hopper as dead load (normal case):
- discharge the scale/hopper
- press [by load]

Set deadload	After OK or ↓ confirmation of the change is displayed:

If the mV/V value of the dead load was calculated, or if it is known from the previous calibration, the value can be overwritten by pressing [by mV/V].

WP A/Calibration			
Max	3000 d	3000 kg	
Scale interval	3000 d	1 kg	
Deadload at	0.00 kg	0.000000	mV/V
Max at	3000.00 kg	1.000000	mV/V
Calibrated at	3000.00 kg	1.000000	mV/V
Sensitivity	833.33 d/mV	4.000000	µV/d
by load	by mV/V		Test

Possible error messages

Set deadload failed above physmax	The dead load entered in mV/V plus maximum capacity in mV/V is higher than 3 mV/V (= 36 mV).
Set deadload failed no standstill	The scale is not stable. Remedial action: Check the mechanical function of the scale; adapt the filter setting; reduce the resolution; if necessary, adapt the stability conditions.
Set deadload failed deadload < -0.1mV/V	Measurement signal is negative (load cells connected with wrong polarity or defective) when determining the dead load with [by load].
Set deadload failed overflow in arithmetics	The dead load entered in mV/V is higher than 5mV/V.

5.4.6 Calibration with Weight (by Load)

Select [by load] for calibration using weight.

Place CAL weight on the scale and enter value	
2000	kg

The weight value for the calibration weight must be entered in a separate window.

After applying the weight, enter the weight value and confirm with [OK]. The weight unit for the calibration weight (press [ABC] to change) may differ from the unit in the instrument; conversion is automatic.
Afterward, the following message is displayed:

Setting SPAN by load

Weight value, weight unit and measuring signal in mV/V corresponding to this value are displayed in the [Calibrated at] line.

WP A/Calibration				
Max	3000 d		3000 kg	
Scale interval	3000 d		1 kg	
Deadload at	165.11 kg		0.057920	mV/V
Max at	3000.00 kg		1.052369	mV/V
Calibrated at	2000 kg		0.701579	mV/V
Sensitivity	876.97 cnt/d		4.209600	µV/d
by load	by mV/V	by data	Linear.	Test

Set SPAN failed No stability

The scale is not stable.
Remedial action: Check the mechanical function of the scale; adapt the filter setting; reduce the resolution; if necessary, adapt the stability conditions.

Set SPAN failed Load below deadload

The weight on the scale is less than the dead load after input of the weight value.

The next step is calculation of the test value with [Test] (see Chapter 5.4.11), and calibration is completed with [Exit] (see Chapter 5.4.12).

Determining span without weight

WP A/Calibration				
Max	3000 d		3000 kg	
Scale interval	3000 d		1 kg	
Deadload at	3.00 kg		0.001000	mV/V
Max at	3000.00 kg		0.000000	mV/V
Not calibrated				
Sensitivity	833.33 cnt/d		4.000000	µV/d
by load	by mV/V	by data	Linear.	Test

5.4.7 Calibration with mV/V Value

The scale can be calibrated without weights. During input of the load cell mV/V value, the acceleration of gravity at the place of installation can be taken into account. The STAR load cell data is based on the acceleration of gravity effective at Hamburg, Germany: 9.81379 m/s².

Calculation of the average load cell sensitivity:
With D1 specification load cells, the use of sensitivity C given in the data sheet is sufficient.
The average load cell sensitivity C_{Avr} is calculated as follows:

$$C_{Avr} = \frac{\frac{C1}{Ra1} + \frac{C2}{Ra2} + \ldots + \frac{Cn}{Ran}}{\frac{1}{Ra1} + \frac{1}{Ra2} + \ldots + \frac{1}{Ran}}$$

The formula is simplified when the output resistance Ra for the load cells is almost equal:

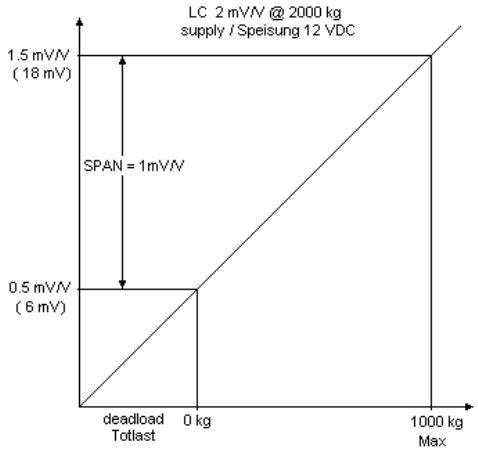
$$C_{Avr} = \frac{1}{n} \sum C$$

Span: Calculation of the equivalent input voltage in mV/V
Span indicates the equivalent input voltage in mV/V related to the maximum capacity (Max) of the scale. It is calculated as follows:

$$\text{SPAN [mV/V]} = \frac{\text{maximum capacity} * \text{load cell sensitivity } C_{Avr} \text{ [mV/V]}}{\text{load cell capacity (nominal load} * \text{number of load cells)}}$$

Dead load: Calculation of the equivalent input voltage in mV/V
The input voltage in mV/V equivalent to the dead load can be calculated by using the dead load rather than the maximum capacity in the formula specified above.
Normally, calculation of the dead load (scale without load/empty hopper) is not necessary. Subsequent dead load correction (as described in Chapter 5.4.9) can be used for later re-determination of the dead load, when the scale/hopper is empty.

Example: Load cell(s) with rated output of 2mV/V at nominal load of 2000 kg, dead load 500 kg, load cell supply voltage 12 VDC



The calibration dialog provides an overview of all settings:

WP A/Calibration		
Max	1000 d	1000 kg
Scale interval	1000 d	1 kg
Deadload at	500.00 kg	0.500000 mV/V
Max at	1000.00 kg	1.000000 mV/V
Calibrated at	1000.00 kg	1.000000 mV/V
Sensitivity	2500.00 cnt/d	12.000000 µV/d

After selecting [mV/V], the values for the Max and for the dead load (if necessary) can be entered.

The next step is calculation of the test value with [Test] (see Chapter 5.4.11), and calibration is completed by pressing Exit (see Chapter 5.4.12).

5.4.8 Calibration with Load Cell Data ("Smart Calibration")

If the scale to be calibrated is not legal for trade, it can be calibrated without weights. The simplest method is with load cell data and without calculation; another method (with mV/V) is described in Chapter 5.4.7.

WP A/Calibration			
Max	3000 d	3000 kg	
Scale interval	3000 d	1 kg	
Deadload at	3.00 kg	0.001000	mV/V
Max at	3000.00 kg	0.000000	mV/V
Not calibrated			
Sensitivity	833.33 cnt/d	4.000000	µV/d
by load	by mV/V	by data	Linear.	Test

Start by pressing [by data].

WP A/Calibration/Loadcell configuration		
Number of loadcells	⇵	4
Nominal load		3000 kg
Gravity		9.81379 m/s²
Hysteresis error		not specified
Certified data		all LC same
LC sensitivity		1.000000 mV/V
Enter	Calc	

WP A/Calibration/Loadcell configuration		
LC resistance	⇵	600.000 Ω
Enter	Calc	

[Number of loadcells]
Number of load cells connected in parallel (1, 2...<4>...9, 10)

[Nominal load]
Nominal load E_{max} of a load cell (not the overall nominal weight of the scale).

[Gravity]
Acceleration of gravity at the place of installation; default is the value for Hamburg, Germany, 9.81379 m/s².

[Hysteresis error]
When switching from [Not specified] to [Specified], values for [Correction A/B] must be filled in. The data is given on the load cell certificate.

[Certified data], [LC sensitivity], [LC resistance]
With [all LC same], only 1 value for the sensitivity [LC sensitivity] and the output resistance [LC resistance] must be filled in. With [each LC specific], individual values for each load cell are requested.

[Calc]
The mV/V value is calculated and after confirmation with [OK], the calculated mV/V value is stored in the calibration data.

5.4.9 Subsequent Dead Load Correction

If the hopper/platform weight changes by an amount that is higher than the zero-setting range; e.g., due to dead load reduction, dead load increase or mechanical changes, the functions for automatic zero tracking and manual zero setting no longer work. To view the range which is already utilized by zero tracking or zero setting, select [Calibration] and press Info; this also activates 10-fold increased resolution of the weight value. Press Info again to return to the previous state:

Current zero setting: 0.123 kg

If the entire zero-setting range is already utilized, you can still correct the dead load (CAL switch must be open) without affecting other calibration data/parameters.
To do this, select Setup-[Calibration]-[Modify] and determine the dead load with [Dead load at]-[by load] (see Chapter 5.4.5).

5.4.10 Linearization

After selecting Setup-[Calibration]-[New]/[Modify] and after completing calibration, select the linearization menu with softkey [Linear.]:

by load	by mV/V	by data	Linear.	Test

When you press [Linear], the menu shown below appears:

WP A/Calibration/Linearisation				
Max at	3000.00 kg		1.000000 mV/V	
Add			by mV/V	by load

To add a new linearization point, press [Add], fill in the weight value, apply the weight and press [by load]. Then fill in the corresponding value in mV/V for the weight. After pressing [mV/V], the value can be entered directly.

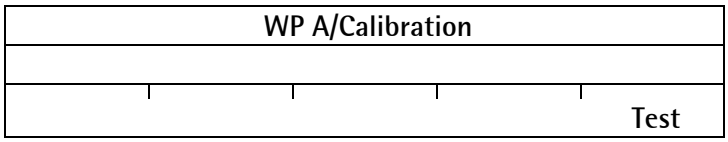
Up to 3 linearization points can be determined.
A linearization point can be added with [Add], removed with [Delete] and changed with [Change].

WP A/Calibration/Linearisation				
1. Lin. point	750 kg		0.250010 mV/V	
2. Lin. point	1500 kg		0.500020 mV/V	
3. Lin. point	2250 kg		0.750040 mV/V	
Max at	3000.00 kg		1.000000 mV/V	
Add	Change	Delete	by mV/V	by load

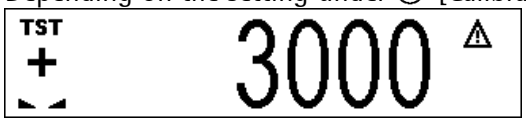
A linearization point can be selected with ↑/↓, changed with [Change] and deleted with [Delete].

5.4.11 Test Value Determination/Display

Press [Test] to activate test value calculation. The maximum capacity (Max) is displayed with the designation **TST** without a weight unit.



Depending on the setting under Setup-[Calibration]-[Param]-[Test mode], either

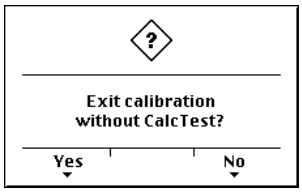


- the maximum capacity with [Absolute], or
- the deviation from the test value with [Relative]

is shown when you press Fn to view the test data.

5.4.12 Finishing/Saving the Calibration

Finish the calibration with Exit.



You are prompted to confirm whether calibration should be closed without determining the test value.

Calibration not complete Exit calibration?	If not data all was determined when calibrating with [New] (e.g. dead load not set/entered), this message is shown. Press [Yes] to confirm and then press Exit again; another prompt is displayed:
Exit calibration ?	Press [Save] to save changes in calibration data. If you press [Undo], changes are not saved and the display returns to the selection menu for the weighing points.
Saving calibration	Confirm, or
Exit calibration	close the menu.

After finishing the calibration, set the CAL switch to the closed position; see also Chapter 5.1.1.

5.4.13 Parameter Input

Open the menu via Setup-[Calibration]-[Param].

WP A/Calibration		
Measuretime	⇵	160 ms
Digital filter		bessel
External supply		8 - 12 VDC
Fcut		3.00 Hz
Test mode		absolute
W & M		none
Standstill time		0.50 s
Standstill range		1.00 d

This line is shown only if the filter is on.

[Measuretime]
Select the measuring time; possible values: 5, 10, 20, 40, 80, 160, 320, 640, 960, 1280, 1600 ms. In 'legal-for-trade' mode select <= 1 s.

[Digital filter]
The digital filter can be switched on only with the measuring time set to <= 160 ms.
Select the filter characteristic [off], [bessel], [aperiod.], [butterw.], [tscheby.].

[External supply]
With external load cell supply (e.g. 7.5 VDC via 1626/60 with MX8 = closed), [below 8 VDC] can be selected to adapt the sense voltage monitoring to the lower supply voltage.

[Fcut]
Enter the cut-off frequency for the filter (0.1 – 80 Hz); the setting is dependent on the measuring time.

[Test mode]
With [Absolute], the test value is calculated when the test is called. With [relative], the deviation from the initially stored test value is displayed; see Chapter 5.4.11.

[W & M]
Setting for 'legal-for-trade' mode; select [none], [OIML], [NTEP] (for USA) or [NSC] (for Australia), see Chapter 5.4.13.1.

[Standstill time]
Settings [Standstill range] and [Standstill time] are required for determining the mechanical stability of the scale. Input in seconds; permissible range 0.01 bis 2 sec. (max. measuring time x 32). If 0 is set, stability is not checked. The stability time must not be less than the measuring time and not greater than 32 times the measuring time.

[Standstill range]
The scale is stable as long as any changes in the weight value are within this range; permissible range: 0.01d to 10.00d. In 'legal-for-trade' mode select <= 1 d.

WP A/Calibration		
Tare timeout	2.5	s
Zeroset range	50.00	d
Zerotrack range	0.25	d
Zerotrack step	0.25	d
Zerotrack time	0.0	s
Overload	9	d

[Tare timeout]
Enter a timeout value between 0.1 and 25 s for a taring/zero set command that cannot be executed (e.g., if scale mechanically unstable, filter settings faulty, resolution too high, stability condition too narrow).

[Zeroset range]
Determine a +/- range around the zero point determined by the dead load during calibration; within this range:
- the displayed gross weight can be set to zero by pressing the zero-setting key (or by a corresponding external command), and
- automatic zero tracking is active

Available range: 0.00 d to 10000.00d
In 'legal-for-trade' mode a value <= 2 % of Max. must be entered. Example: 60 d for 3000e, class III.

[Zerotrack range]
Range within which automatic zero tracking compensates deviations; 0.25 to 10000.00d. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

[Zerotrack step]
Step for automatic tracking; 0.25 to 10d. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

[Zerotrack time]
Enter a time interval for automatic zero tracking within 0.0 (tracking switched off) and 25 s. In 'legal-for-trade' mode a value of 0.25 d has to be entered.

[Overload]
Weighing range above the maximum capacity (Max), without error message. Available range: 0 to 9999900 d. In 'legal-for-trade' mode max. 9 d=e has to be entered.

WP A/Calibration		
Min	50	d
Range mode	Single range	

[Min]
Minimum weight at which a print command can still be executed. Range is 0 to 9999900 d.
In 'legal-for-trade' mode min. 20 d has to be entered.

5.4.13.1 Legal-for-Trade Operation

Under Setup-[Calibration]-[Param]-[W&M] you can choose between: [none] and a legal-for-trade mode [OIML], [NTEP] or [NSC].

	[none]	[OIML]	[NTEP]	[NSC]
Gross weight display	B	B	G	G
Min. meas. signal	0.125 mV/V at 30000 d	0.125 mV/V at 3000 e	0.125 mV/V at 3000 e	0.125 mV/V at 3000 e
	0.25 mV/V at 60000 d	0.25 mV/V at 6000 e	0.25 mV/V at 6000 e	0.25 mV/V at 6000 e
		0.42 mV/V at 10000 e	0.42 mV/V at 10000 e	0.42 mV/V at 10000 e

If legal-for-trade operation is selected, the parameters (zero tracking etc.) must be set accordingly; they are not checked. The relevant CAL switch (see Chapter 5.1.1) must be sealed in the closed position.

5.4.13.2 Multiple Range Scale/Multi-Interval Scale

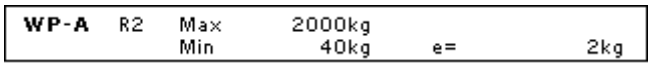
Range selection is controlled by three parameters under Setup-[Calibration]-[Param].

WP A/Calibration			
Range mode	⇵	**Multiple range**	Select [Multiple range] or [Multi-interval]
Range limit 1		**1000 kg**	Switch point from range 1 to 2
Range limit 2		**2000 kg**	Switch point from range 2 to 3

Multiple range scale (cl. III, or cl. I and II single range scale with variable scale interval)
With [Range mode] = [Multiple range], the scale has up to 3 ranges with different resolutions.
The switch points [Range limit 1] and [Range limit 2] are the range limits. As soon as the gross weight exceeds range 1, the next higher range with the next higher interval becomes valid (1->2->5->10->20->50->100->200). When reducing the weight, the interval of the previous range is kept. When the gross weight is <= 0.25 d of range 1 and the scale is stable and not tared, the scale returns to range 1 with the corresponding interval.

Multi-interval scale (cl. III, or cl. I and II single range scale with variable scale interval)
With [Range mode] = [Multi-interval], the scale has up to three ranges with different resolutions. Each range has the corresponding interval. Unlike [Multiple range], switching the interval is also triggered by weight reduction; i.e., when the weight drops below the range limits.

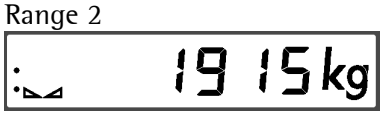
During calibration, the multiple range/multi-interval function is always switched off.
The weight display header (VNC) includes the current range (R1, R2, R3), Max, Min and d (or e with legal-for-trade instruments) (Example: multiple range scale in range 2):



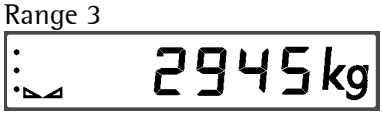
The ranges are marked by points on the left side of the display.

Range 1

Range 2



Range 3

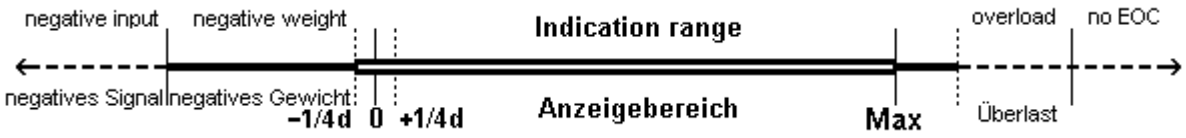


5.5 Error Messages

5.5.1 Measuring Circuit Error Messages

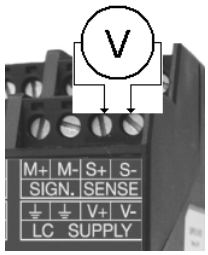
The weighing electronics can generate error messages, which are output on the weight display.

VNC Text	Cause
Arith err	Internal arithmetic overflow (faulty calibration values)
Overload	Input voltage is higher than Max + (x d)
No EOC	Input signal is higher than the permissible range of 36 mV. However, the trouble cause can also be due to an error in the analog section, to a defective load cell or to a cable break
No sense voltage	Sense line or supply line is interrupted or connected with wrong polarity or sense voltage is low
Negative Input	Input voltage is negative (e.g. wrong polarity of load cell signal or supply voltage)

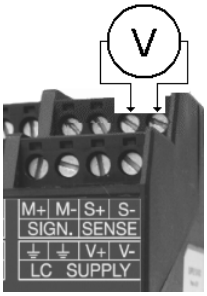


5.5.1.1 Testing the Measuring Circuit

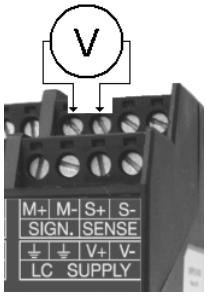
A simple test with the load cells connected can be carried out using a multimeter (not with external supply or intrinsically safe load cell interface):



12 V +/- 0.8 V
(symmetrical to housing GND)
Supply voltage



12 V +/- 0.8 V
(symmetrical to housing GND)
Sense voltage



0 - 12 mV @ LC with 1.0 mV/V
0 - 24 mV @ LC with 2.0 mV/V
Measuring voltage

5.6 Configuring General Parameters

The configuration of parameters which are not related to the weighing electronics is divided into several sections (see Chapter 5.3.5).

5.6.1 Serial Ports

To configure the serial interfaces, select Setup-[Serial ports parameter].

Setup
▸ Serial ports parameter
▸ Operating parameter

Select [Serial ports parameter] with ↑/↓ and OK

Setup/Serial ports		
Remote display	⇵	Builtin RS485
SMA		none
Param		

[Remote display]
Select the serial interface to which the remote display is connected and then select [Param] to define the [Baudrate].

Setup/Serial ports/Builtin RS485		
Assigned to		Remote display
Protocol		Remote display
Baudrate	⇵	9600 bd
Bits		7
Parity		even
Stopbits		1
Mode		single transmitter

Select [Baud rate] with ↑/↓ and set the baud rate with ←/→

You can only set the baud rate to 300, 600, 1200, 2400, 4800 or 9600. The other parameters (displayed in light-gray) cannot be changed.
If only 1 instrument is connected to a PR1627 or PR1628 (normal case), [Mode] must be set to [single transmitter].

Save settings

5.6.2 SMA Protocol

Select an RS-485 interface under Setup-[Serial ports parameter].

Setup/Serial ports		
Remote display		none
SMA	⇵	Builtin RS485
Param		

Only the baud rate is adjustable; the other parameters are fixed.

Setup/Serial ports/Builtin RS485		
Assigned to		SMA
Baudrate	⇵	9600 bd
Bits		8
Parity		none
Stopbits		1

Press ↑/↓ to select [Baudrate] and set the baud rate with ←/→

The SMA protocol is described in Chapter 5.7.

5.6.3 Operating Parameters

Define the basic operating parameters under Setup-[Operating parameter].

Setup/Operating parameter	
AccessCode	0
SetTareKey	tare & reset tare
SetZeroKey	only when not tared

[AccessCode]
The access code can be used to protect the [Setup] from unauthorized operation. Enter a number with up to 6 digits. As long as you are in this menu, the value can be overwritten as required. When [AccessCode] is set to 0, no access code ist prompted.

[SetTareKey]
The SetTare function can be configured (VNC operation / Internet browser).
[tare & reset tare]: the scale is tared if it was not tared previously; otherwise, tare is reset.
[tare & tare again]: when you press the [Tare] key, the current value is stored in the tare memory and a net weight of 0 is displayed.
[disabled]: The tare key has no function.

[SetZeroKey]
The SetZero function (VNC operation / Internet browser) can be limited to gross mode with [only when not tared] or switch the scale to gross mode automatically with [reset tare on zeroset]. If the zero-setting key with these settings has no effect, the configured zero-setting range (around the zero-point set with the dead load) is already utilized due to a previous zero-setting operation and/or automatic zero setting.
[disabled]: The key has no function.

Save changes ?

To close the menu, press Exit. Press [Yes] to save the data, or [No] to close the menu without changing data.

5.6.4 Fieldbus Parameters

Setup
▸ Serial ports parameter
▸ Operating parameter
▸ Fieldbus parameter

Press ↑/↓ and OK to select [Fieldbus parameter]

This menu item can only be selected if the instrument is a PR5220/01 or a PR5220/04 version.
The instrument version automatically determines the corresponding protocol:
[Profibus-DP] for PR5220/01 and [DeviceNet] for PRPR5220/04.
Dependent on the interface type, additional parameters are required:

[Profibus-DP]

Setup/Fieldbusparameter	
Protocol	Profibus-DP
Profibus-DP Address	1

[DeviceNet]

Setup/Fieldbus	
Protocol	DeviceNet
DeviceNet baudrate	500k
DeviceNet MAC-ID	1

Press ←/→ to select 500, 250 or 125 k.
Select address 1 ... 62

Closing the menu

Save changes ?

To close the menu, press Exit. Reply [Yes] to save the data,
or [No] to close the menu without changing data.

5.6.5 Network Parameters

You can configure settings for the network connections (built-in LAN adaptor) under Setup-[Network parameter].

Setup/Operating parameter		
HW address	00:90:6C:FB:E9:85	Fixed address determined by the instrument.
Hostname	PR5220-UDOWEIGH	The device name can be defined* by the user.
Use DHCP	☑	The address is assigned by the server
IP Address	172.24.21.82	Address assigned by the server
Subnetmask	255.255.240.0	Mask for the permissible IP address range
Standardgateway	0.0.0.0	IP number for the gateway
Remote access		
VNC-Client	255.255.255.255	Permitted client for instrument operation

*The [Hostname] is subject to the following restrictions:
Minimum number of characters: 2, maximum number of characters: 24
1. The first character must be a letter. Spaces are not permitted.
0-9, A-Z (upper and lower case letters are not distinguished) are permitted.
- or . may be included, but neither at the end nor in succession.

When setting [IP address], [Subnetmask] and [Standardgateway], please consult with your network administrator.

You can configure access permissions for the address specified under [VNC client]:

VNC client	0.0.0.0.	Access over VNC not permitted
VNC client	172.24.21.101	Access only from client machine with this address
VNC client	172.24.21.255	Access from any client with address within range 172.24.21.1 to 254
VNC client	255.255.255.255	Access from client with any address

5.7 Limit Values, Digital Inputs and Outputs

5.7.1 Conditions for Limit Values and Digital Inputs, States for Outputs

The limit values and digital inputs can be combined with conditions that must be met before an action is executed. With outputs, these conditions can be output as states directly. Selection is from the following list:

Selection list for [condition] Function	SPM bit(dec)	Explanation Condition is met, if not true (=0) or if true (=1)
no condition	-----	No condition
actual diginp1	X00=0/1	Digital input 1
actual diginp2	X01=0/1	Digital input 2
actual diginp3	X02=0/1	Digital input 3
actual limit 1	X16=0/1	Limit signal 1
actual limit 2	X17=0/1	Limit signal 2
actual limit 3	X18=0/1	Limit signal 3
ADC error	X32=0/1	Error in load cell/ ADC area, negative/ far outside scale
above Max	X33=0/1	Weight above Max
overload	X34=0/1	Weight above (Max plus the range which is still permissible)
below zero	X35=0/1	Weight below zero
center zero	X36=0/1	Within 1/4 d of zero
inside ZSR	X37=0/1	Within zero-setting range
standstill	X38=0/1	Mechanical stability of the scale
dimmed	X39=0/1	Weight below zero or above Max
command error	X48=0/1	Command was no executed; e.g. zero-setting command, but the weight is out of the zero-setting range
command busy	X49=0/1	Command is being executed
power fail	X50=0/1	Set after power-on (=power failure)
test active	X56=0/1	Analog test was started
cal active	X57=0/1	Calibration was started
tare active	X58=0/1	Tare step is active
marker bit 1	X64=0/1	Marker bit 1; after power-on, the markers are set to '0'
marker bit 2	X65=0/1	Marker bit 2,
marker bit 3	X66=0/1	Marker bit 3,

5.7.2 Configuring Digital Inputs and Outputs

Under Setup-[Digital I/O parameter], you can open the configuration menu for outputs and inputs:

Setup/Digital I/O parameter		
Output 1	marker bit 1	X64=1
Output 2	marker bit 2	X65=1
Output 3	marker bit 3	X66=1
Input 1 on	-no action-	
Input 1 off	-no action-	
Input 2 on	-no action-	
Input 2 off	-no action-	
Input 3 on	-no action-	
Input 3 off	-no action-	

5.7.3 Configuring Outputs

Configure the required function for [Output 1] to [Output 3] by selecting a signal from the list; see Chapter 5.7.1. The output goes to the corresponding state.

Example:

Setup/Digital I/O parameter		
Output 1	below zero	X35=1
Output 2	above Max	X33=0
Output 3	center zero	X36=1
Input 1 on	-no action-	

[Output 1] is true (active), when the weight value drops below zero (X35=1).
[Output 2] remains (active), as long as the weight is not above Max (X33=0).
[Output 3] is true (active), when the weight is zero +/- 1/4 d (X36=1).

5.7.4 Configuring Inputs

An action both for signal change from 0 to 1 (on) and from 1 to 0 (off) can be determined for each of the three inputs. The action may be dependent on another condition which must be met.

Setup/Digital I/O parameter			
Output 1		marker bit 1	X64=1
Output 2		marker bit 2	X65=1
Output 3		marker bit 3	X66=1
Input 1 on		⇵ set tare	X113=1
	Condition	no condition	-----
Input 1 off		-no action-	
Input 2 on		-no action-	
Input 2 off		-no action-	
Input 3 on		-no action-	
Input 3 off		-no action-	

1. Determining an action
Determine the action for the rising edge of input 1 under [Input 1 on] from the following list (here: When the input signal changes from 0 to 1, a tare command is generated).
Accordingly, an action for the falling edge can be determined.

Selection list for actions of the inputs [Input 1/2/3 on/off]

Function	SPM bit	
-no action-	-----	No function
set marker 1	X64=1	Set marker 1
set marker 2	X65=1	Set marker 2
set marker 3	X66=1	Set marker 3
select net	X72=1	Select net
set zero	X112=1	Set zero
set tare	X113=1	Set tare
reset tare	X114=1	Reset tare
set test	X115=1	Activate the analog test
reset test	X116=1	Finish the analog test
reset PWF	X117=1	Reset power fail
set fixtare	X118=1	Set fixtare (use the value in address D31 as a tare value)
get fixtare	X119=1	Save gross value as fixtare in address D31
set print	X120=1	Activate a print order
clr marker 1	X64=0	Clear marker 1
clr marker 2	X65=0	Clear marker 2
clr marker 3	X66=0	Clear marker 3
select gross	X72=0	Save the gross weight in address D11

2. Determining a condition

The selected action of each digital input can be combined with a condition that must be met for signal change from 0 to 1 (on) or for signal change from 1 to 0 (off). Select the condition from the list; see Chapter 5.7.1. No condition is defined when selecting [no condition]; the action is executed directly.

Example: Taring via digital input, only if the instrument is set to gross:

Setup/Digital I/O parameter			
Output 1		marker bit 1	X64=1
Output 2		marker bit 2	X65=1
Output 3		marker bit 3	X66=1
Input 1 on		set tare	X113=1
	Condition	⇄tare active	X58=0
Input 1 off		-no action-	
Input 2 on		-no action-	
Input 2 off		-no action-	
Input 3 on		-no action-	
Input 3 off		-no action-	

When input 1 changes from 0 to 1 [Input 1 on], a taring signal is activated only, if the condition under [Condition] is met (here: the scale was not tared previously; this is determined by [tare active X58=0]).

5.7.5 Configuring Limit Values

Each limit value consists of a switch-on and a switch-off point for definition of a hysteresis. The three pairs of values must be entered according to the same principle. The limit values always refer to the gross weight. Values between -0.01 x Max and 1.01 x Max of the relevant scale are permissible.

Setup
▸ Serial ports parameter
▸ Operating parameter
▸ Fieldbus parameter
▸ Network parameter
▸ Calibration
▸ Limit parameter
▸ Digital I/O parameter

Press [↑]/[↓] and [OK] to select [Limit parameter]

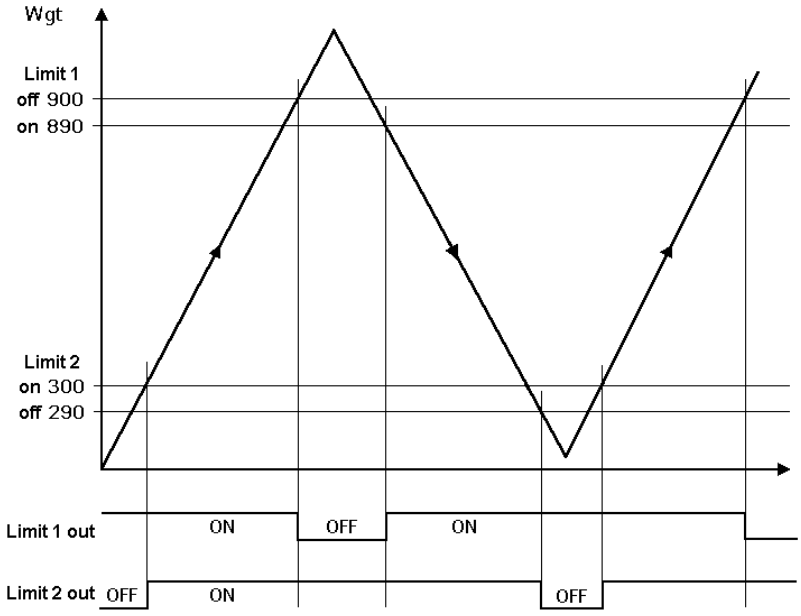
Setup/Limit parameter		
Limit 1 on		890 kg
	Action	-no action-
Limit 1 off		900 kg
	Action	-no action-
Limit 2 on		300 kg
	Action	-no action-
Limit 2 off		290 kg
	Action	-no action-

Determine the limit values

Setup/Digital I/O parameter		
Output 1	limit 1 out	X16=1
Output 2	limit 2 out	X17=1

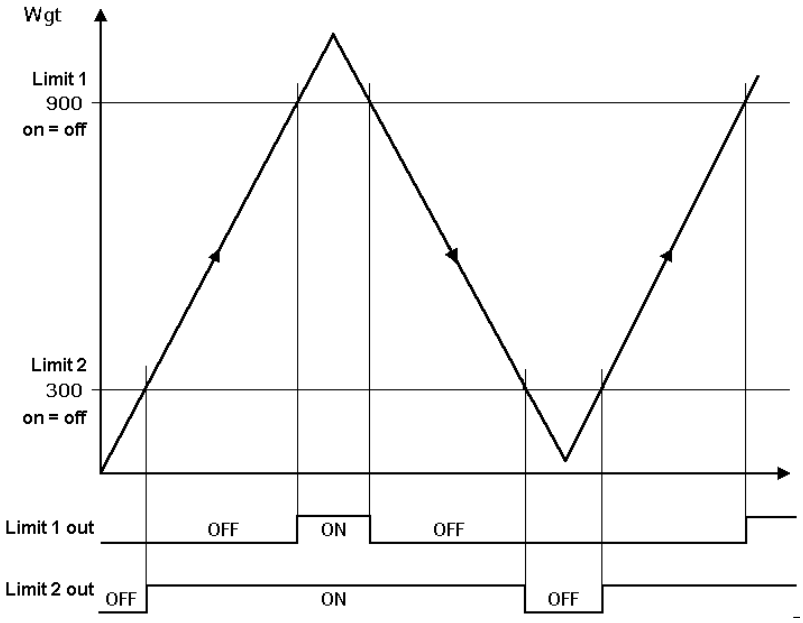
Assign the outputs

Example:



The output signal (Limit 1 out) of limit 1 switches OFF above a weight of 900 kg. The output signal (Limit 2 out) of limit 2 switches OFF below a weight of 290 kg. Both limit values have a hysteresis of 10 kg.

In the event of a power failure, the two outputs go to OFF, thus indicating underfill and overfill at the same time.



If the limits (Limit 1 and Limit 2) for 'On' and 'Off' are equal (on = off), output 1 (Limit 1 out) switches ON, when the weight (Wgt) exceeds the value and output 2 (Limit 2 out) switches OFF, when the weight drops below the value.

Setup/Limit parameter			
Limit 1 on			**900 kg**
	Action	**set marker 1**	**X64=1**
	Condition	**no condition**	**-----**

1. Determining an action

Determine the action for the rising edge of the reference signal under [Limit 1 on] from the following list (here: Marker 1 is set when 900 kg are exceeded).
Accordingly, an action for [Limit 1 off] can be determined.

Function	SPM bit	
-no action-	-----	No function
set marker 1	X64=1	Set marker 1
set marker 2	X65=1	Set marker 2
set marker 3	X66=1	Set marker 3
select net	X72=1	Select net
set zero	X112=1	Set zero
set tare	X113=1	Set tare
reset tare	X114=1	Reset tare
set test	X115=1	Activate the analog test
reset test	X116=1	Finish the analog test
reset PWF	X117=1	Reset power fail
set fixtare	X118=1	Set fixtare (use the value in address D31 as a tare value)
get fixtare	X119=1	Save gross value as fixtare in address D31
set print	X120=1	Activate a print order ?
clr marker 1	X64=0	Clear marker 1
clr marker 2	X65=0	Clear marker 2
clr marker 3	X66=0	Clear marker 3
select gross	X72=0	Save the gross weight in address D11

2. Determining a condition

Additionally, a condition [Condition] can be assigned to the signal; see Chapter 5.7.4.

5.8 Analog Output

Determine the analog output under Setup-[Analog output parameter].

Setup
▸ Serial ports parameter
▸ Date & Time
▸ Fieldbus parameter
▸ Network parameter
▸ Calibration
▸ Limit parameter
▸ Digital I/O parameter
▸ Analog output parameter

Press ↑/↓ and OK to select [Analog output parameter]

Setup/Analog output parameter		
Analog mode	⇵	no output
Analog range		0 ... 20 mA
Output on error		0 mA
Output if < 0		0 mA
Output if > Max		20 mA
Weight at 0/4 mA		0 kg
Weight at 20 mA		3000 kg

[Analog mode]	[no output]		The analog output is not used
	[Gross	D08]	Output of the gross weight
	[Net	D09]	Output of the net weight
	[Select	D11]	Output of the value on the display
	[Transparent	D30]	Output of the value in D30
[Analog range]	[0...20 mA]		Output of 0... 20 mA
	[4...20 mA]		Output of 4... 20 mA
[Output on error]	[0 mA]		Set the output to 0 mA
	[4 mA]		Set the output to 4 mA
	[20 mA]		Set the output to 20 mA
	[hold]		The last output value is held
[Output if < 0]	[0 mA]		Set the output to 0 mA
	[4 mA]		Set the output to 4 mA
	[20 mA]		Set the output to 20 mA
	[linear]		The output drops below 4 mA up to the limitation (at 4 .. 20 mA)
[Output if > Max]	[0 mA]		Set the output to 0 mA
	[4 mA]		Set the output to 4 mA
	[20 mA]		Set the output to 20 mA
	[linear]		The output exceeds 20 mA up to the limitation
[Weight at 0/4 mA]			Weight value for 0/4 mA output
[Weight at 20 mA]			Weight value for 20 mA output

Press Exit to return to the previous menu [Configuration].

5.8.1 Adapting the Analog Output

The output current can be adapted in small ranges. This is required, if small deviations from the nominal value occur in a connected PLC.
Open the menu with Info [Show HW-slots]-[Slot 1/2 PR5510/07 analog I/O]:

Info/HW-Slots		
	Builtin	RS 232
Slot 1	PR 5510/04	analog I/O
Slot 2		-empty-
Slot 3	Builtin	Digital I/O
Slot 4		Profibus-DP

PR 5510/07 is fitted in Slot 1

Select [PR 5510/07 analog I/O] and confirm with OK

Info/HW-Slots	
PR5510/07 on slot	1
In use by PLC task	2
Analog output	0.0000 mA

Select with ↑/↓

Stop PLC | Stop I/O | Adjust | Reset

Press [Adjust]

Adapt analog output ?

Safety prompt: Reply [Yes] to start adapting.

Info/HW-Slots/Adjust Analog Output Slot 1	
Output	4.000 mA
Measured	4.004 mA

Enter e.g. the value for 4 mA measured by the connected PLC under [Measured].
After pressing OK, the 2nd value (20 mA) is displayed:

Info/HW-Slots/Adjust Analog Output Slot 1	
Output	20.000 mA
Measured	20.010 mA

Enter e.g. the value for 20 mA measured by the connected PLC under [Measured].

Save settings ?

Reply [Yes] to save the data,
or [No] to keep the previous values.

If you want to return to the factory settings (4 mA and 20 mA):
Press [Reset]: A safety prompt is displayed:

Reset to default ?

Reply [Yes] for reset to the factory settings, or
[No], if you want to keep the entered values unchanged.

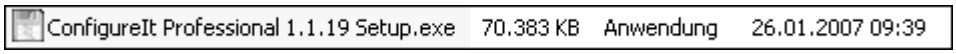
5.9 ConfigureIt Professional

The ConfigureIt Professional program has the following features:

- Searching for an instrument in a network
- Creating and modifying an instrument configuration
- Entering the parameters of an instrument
- Calibration of an instrument using the following methods:
  - with test weights
  - by mV/V
  - using the load cell data ('smart calibration')
- Loading an instrument configuration from an instrument
- Storing an instrument configuration in an instrument or in a file
- Copying instrument configurations (cloning)
- Creating a document (PDF, XLS, etc.) with the instrument configuration

5.9.1 Installation

The installation is done from the CD-ROM delivered with the instrument. It is recommended to close further application programs running on the PC. For installation, approx. 150 Mbytes are required on the hard disk. The minimum is 256 Mbytes working memory; a 2GHz processor needs approx. 5 minutes installation time. Start the program ConfigureIt Professional ... Setup.exe:



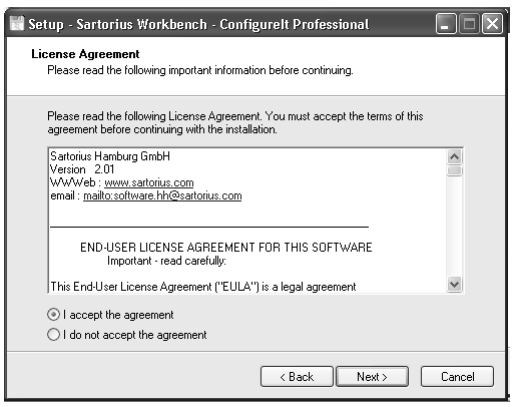
Next step for installation

Return to previous step

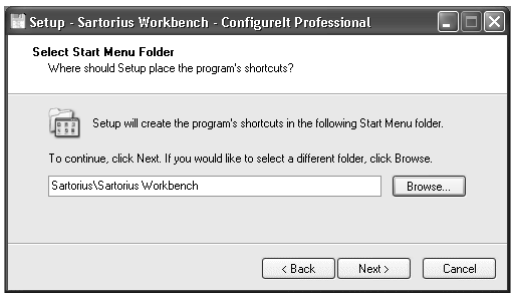
Cancel the installation process

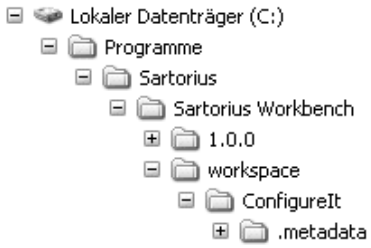
Setup - Sartorius Workbench - ConfigureIt Professional
Welcome to the Sartorius Workbench - ConfigureIt Professional Setup Wizard
This will install Sartorius Workbench - ConfigureIt Professional 1.1.19 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
sartorius
Next >
Cancel

Instructions for closing further application programs

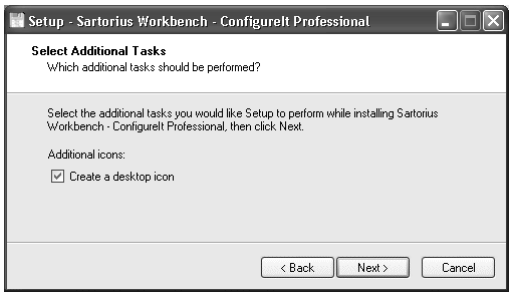

Setup - Sartorius Workbench - ConfigureIt Professional
License Agreement
Please read the following important information before continuing.
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.
Sartorius Hamburg GmbH
Version 2.01
WWWeb : www.sartorius.com
email : mailto:software.hh@sartorius.com
END-USER LICENSE AGREEMENT FOR THIS SOFTWARE
Important - read carefully:
This End-User License Agreement ("EULA") is a legal agreement
I accept the agreement
I do not accept the agreement
< Back
Next >
Cancel

Read the license agreement and click [I accept the agreement] to confirm acceptance.

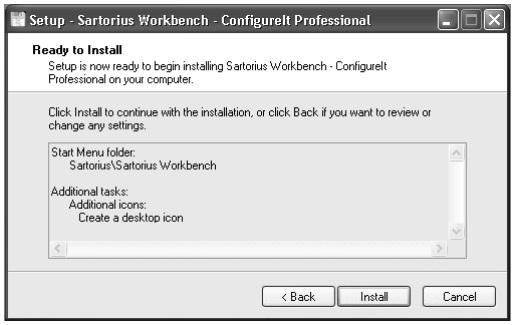

Setup - Sartorius Workbench - ConfigureIt Professional
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
Sartorius\Sartorius Workbench
Browse...
< Back
Next >
Cancel



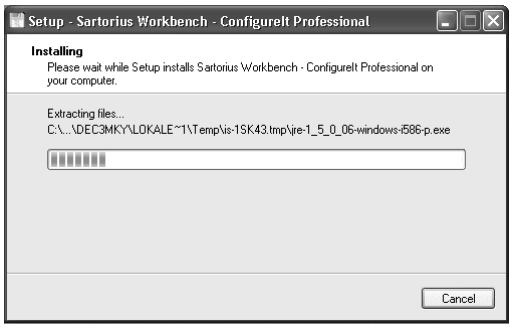
The folder in which the programs and configurations are stored is shown. Click [Browse] to search and define a different folder.


Setup - Sartorius Workbench - ConfigureIt Professional
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing Sartorius Workbench - ConfigureIt Professional, then click Next.
Additional icons:
Create a desktop icon
< Back
Next >
Cancel

To create an icon on the PC desktop for easy starting of the program the box must be activated.


Setup - Sartorius Workbench - ConfigureIt Professional
Ready to Install
Setup is now ready to begin installing Sartorius Workbench - ConfigureIt Professional on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Start Menu folder:
Sartorius\Sartorius Workbench
Additional tasks:
Additional icons:
Create a desktop icon
< Back
Install
Cancel

Continue the installation with [Install].


Setup - Sartorius Workbench - ConfigureIt Professional
Installing
Please wait while Setup installs Sartorius Workbench - ConfigureIt Professional on your computer.
Extracting files...
C:\...\DEC3MKY\LOKALE~1\Temp\is-1SK43.tmp\jre-1_5_0_06-windows-i586-p.exe
Cancel

The progress of installation is displayed; depending on the PC performance, the installation may take some minutes.

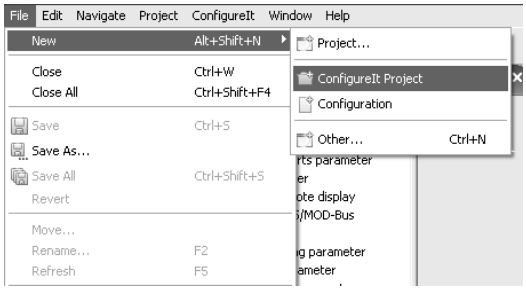
Setup - Sartorius Workbench - ConfigureIt Professional
Completing the Sartorius Workbench - ConfigureIt Professional Setup Wizard
Setup has finished installing Sartorius Workbench - ConfigureIt Professional on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Start ConfigureIt Professional
sartorius
Finish

If the start box is activated, ConfigureIt Professional can be started directly by pressing [Finish].

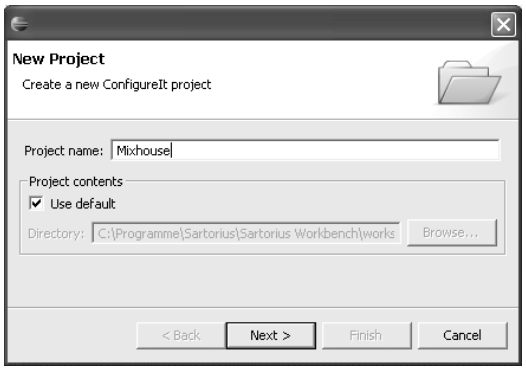
5.9.2 Starting the Program

If the program has already been installed previously (see Chapter 5.3), it can be started using the icon on the desktop:

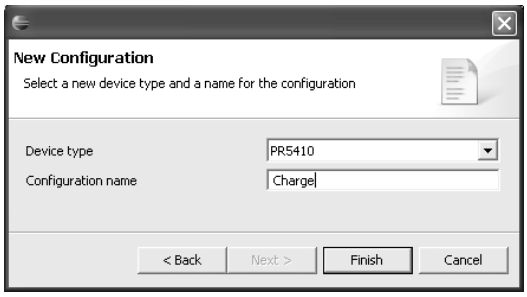
5.9.2.1 Creating a New Project



Select [File]-[New]-[ConfigureIt Project].

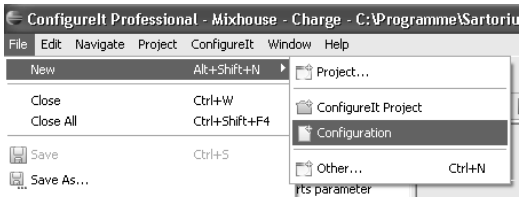


Enter the project name (this is the name of the folder) and press [Next >].

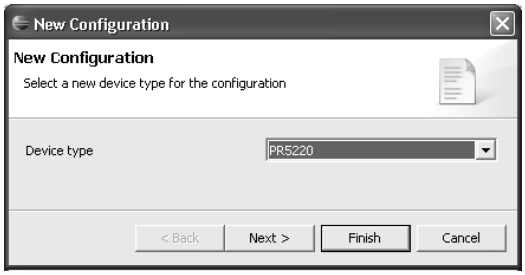


Select the device type: define PR5220 and a configuration name (file) and press [Finish] to continue.

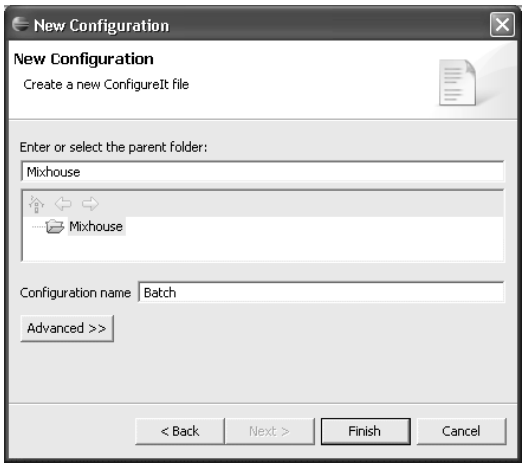
5.9.2.2 Defining a New Configuration



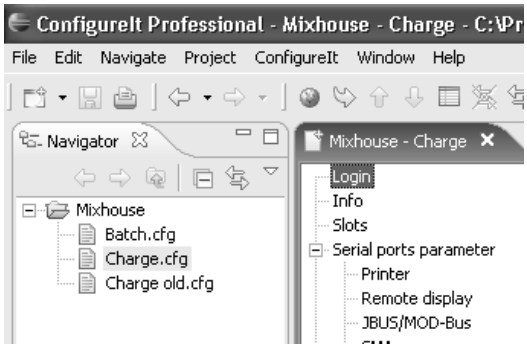
Define a new configuration with [File]-[New]-[Configuration].



Select device type PR 5220 and click [Next >] to continue.

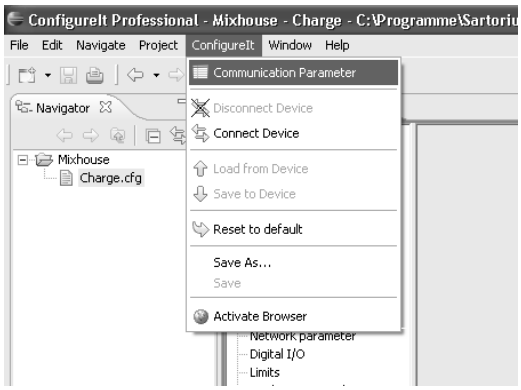


Enter or select the folder for saving the configuration and enter the name for the configuration file.
Complete by clicking [Finish].

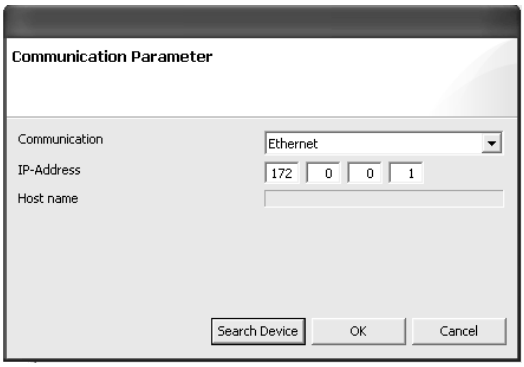


The new configuration [Batch.cfg] is listed in folder [Mixhouse] of the Navigator.

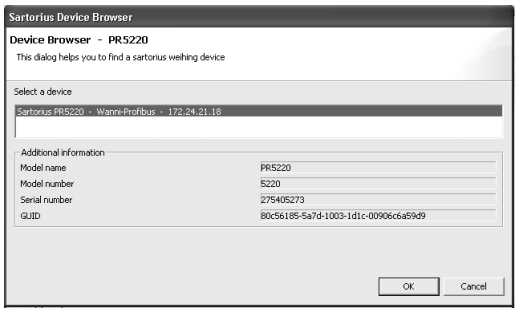
5.9.3 Establishing the Communication to the Instrument



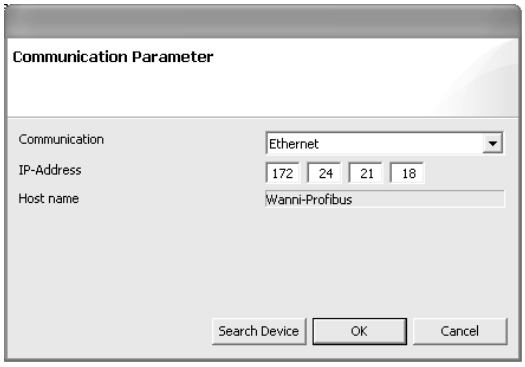
The Navigator area contains the 'Mixhouse' folder with the configuration file 'Charge.cfg'. After double clicking [Charge.cfg] and clicking [Login] once the interface can be selected via [ConfigureIt] -[Communication Parameter].



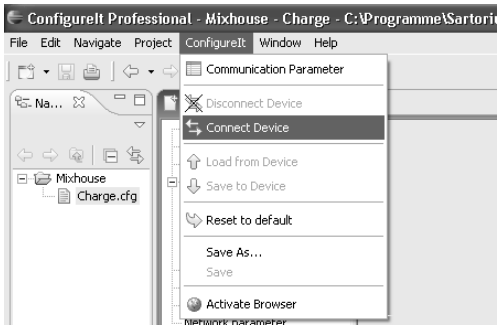
Click [Search Device] to find all devices of the same type in the network. If the address of the instrument is known, it can be entered directly into [IP-Address].



The instruments of the selected type found in the network appear and the instrument to be configured can be selected; press [OK] to continue.



The Ethernet address of the selected instrument is taken over.

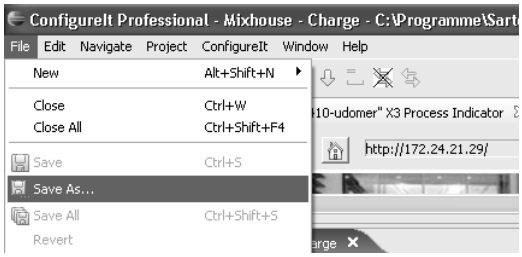


Select [ConfigureIt]-[Connect Device] to start the communication to the instrument.

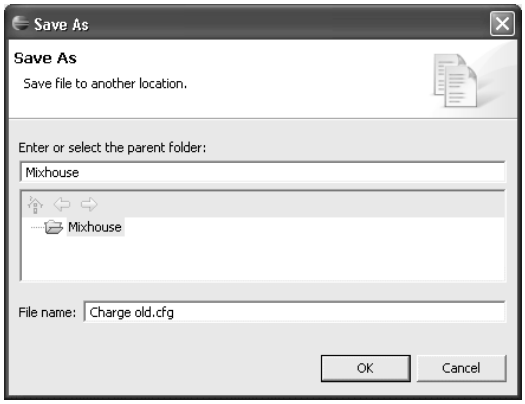
5.9.4 Transferring a Data Set from the Instrument to the PC

Click [ConfigureIt]-[Load from Device]. The complete data set (including the calibration data and parameters) is transferred from the instrument to the PC.

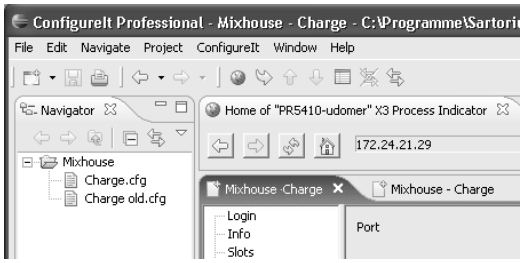
5.9.5 Saving the Current Data Set on the PC



Select [File]-[Save as]; the complete data set (including the calibration data and parameters) is saved in a file.

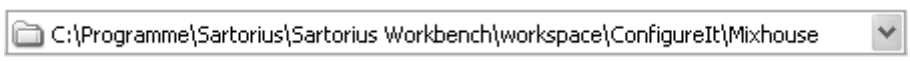


Select a folder and define a new name for the file.

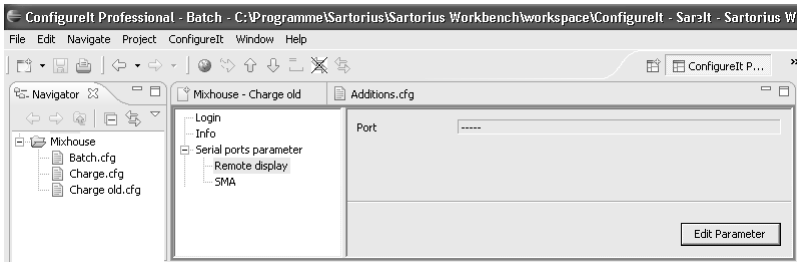


The file [Charge old.cfg] is added under [Mixhouse].

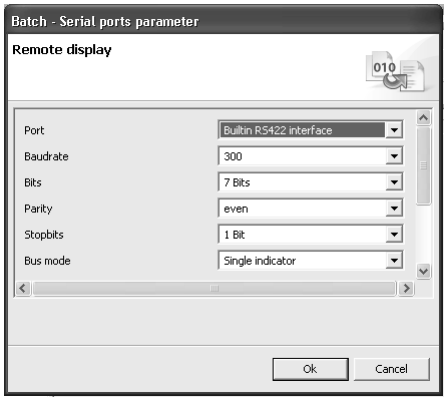
The configuration can be found e.g. in the following folder on the PC using the Explorer:



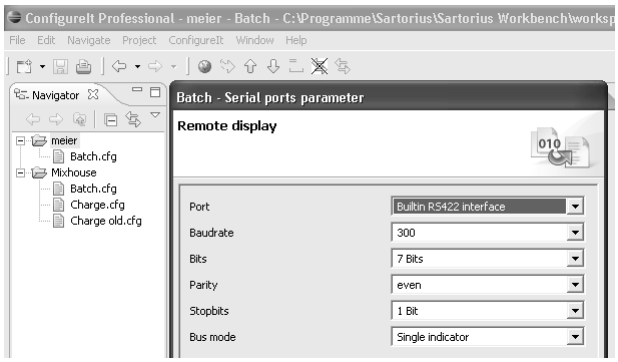
5.9.5.1 Modifying a Data Set



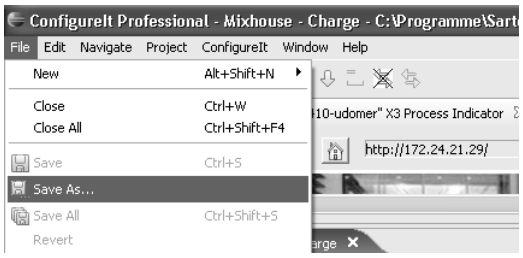
Select the configuration in the Navigator. Then select e.g. [Remote display]. Select [Edit parameter] to start changing.



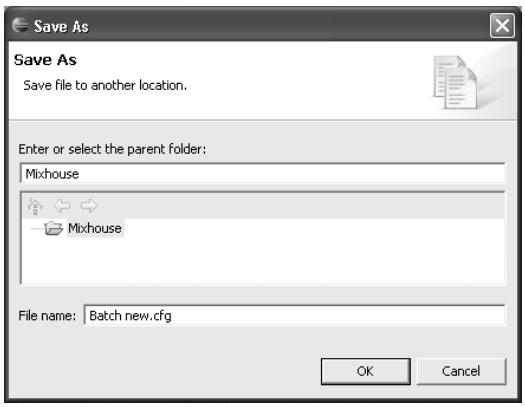
After selecting the port to which the printer of the instrument is connected, the transmission parameters can be changed. Click [OK] to complete.



The new parameters are shown.

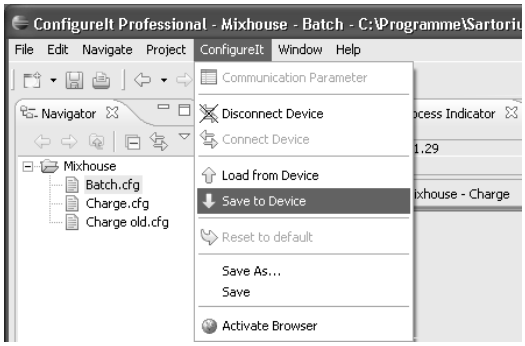


Select [File]-[Save As] to save the modified data set in a file.



Select a folder and define a new name for the file. Click [OK] to complete.

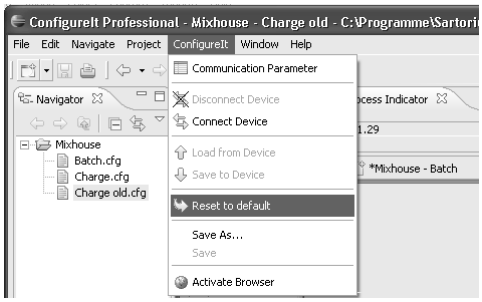
5.9.6 Transferring the Current Data Set or Selected Parameters to the Instrument



Click [ConfigureIT]-[Save to device] to save parts of or the overall configuration in the instrument.

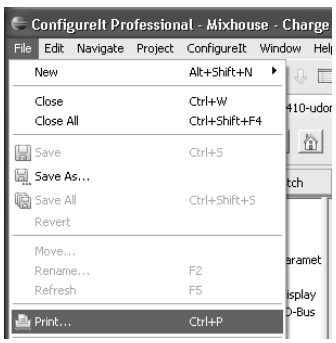
After selecting, define the parameters to be transferred by clicking [>] or [>>] (for all parameters).
Click [OK] to start the transfer.

5.9.7 Resetting the Instrument to Default

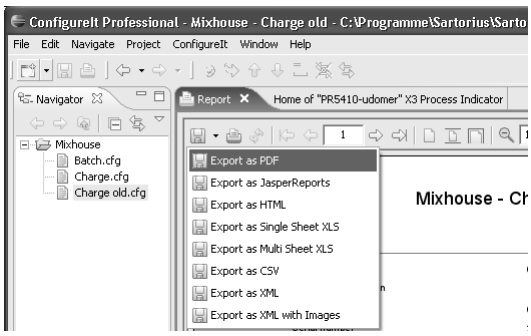


Select [ConfigureIt]-[Reset to default] to reset the instrument to default. For transferring to the instrument, continue with chapter 5.9.6.

5.9.8 Exporting a Data Set as a Printable File

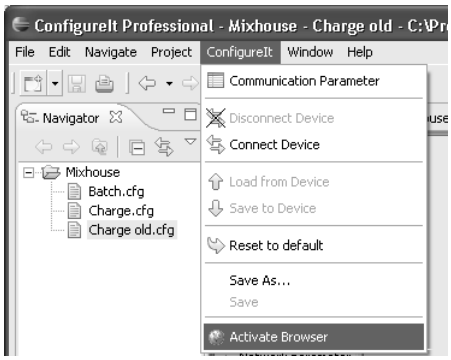


Select [File]-[Print] to transmit the data set to a printer, or to save it in a file.

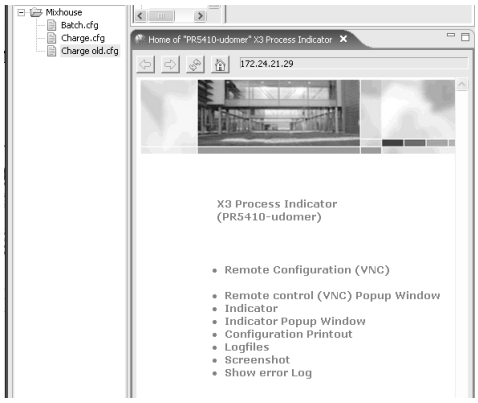


Transmitting the print file to a printer or selecting the data format of the data set for saving.

5.9.9 Operating the Instrument Using the Browser (VNC Program)



Start the browser with [ConfigureIt]-[Activate Browser].

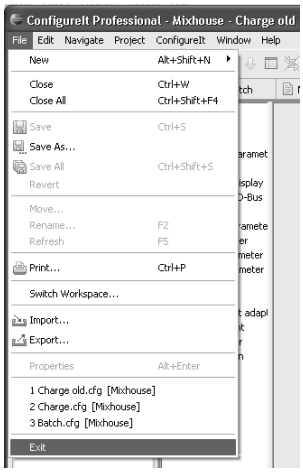


The program can be operated in the same manner as if started directly; see Chapter 5.3.2.

5.9.10 Closing the Program

Before closing the program, make sure that:

- The correct configuration was saved in the instrument
- The configuration of the instrument was saved as .CFG file
- The configuration data were filed as a print-out (e.g. PDF), or printed



To close the program, select [File]-[Exit], or click:

6 SMA Protocol

6.1 General

The protocol of the 'Scale Manufacturers Association' (SMA) provides a simple access to the scale. It can be used for reading data, or for executing functions.

The RS-485 interface is used. Fixed interface settings are 8 bits, no parity and 1 stop bit.

The commands to the transmitter are printable ASCII characters starting with <LF> = 0A hex and ending with <CR> = 0D hex.
The instrument sends a reply on each received command after approx. 100 µs. With commands that wait for stability of the weight value, the reply can be delayed by the waiting time.

6.2 Description of Used Symbols

All characters used in this protocol are printable ASCII characters. Characters <CR> <LF> <SPACE> and <ESC> are excepted.

< >	The symbols < and > are used to put communication fields and non-printable ASCII characters into brackets. These symbols are never part of any communication message.
<LF>	A data set starts with a line feed character (line feed = 0A hex).
<CR>	A data set ends with the carriage return character (carriage return = 0D hex).
'_' <space>	The underscore or space character is used to mark an ASCII space character (20 hex).
<ESC>	The 'escape' character (1B hex) is used to cancel a command.
'!'	An ASCII exclamation mark (21 hex) is used for communication errors.
':'	An ASCII colon is used as a field delimiter.
'-'	ASCII minus sign (2D hex)
'?'	An ASCII question mark (3F hex) is used for unknown or non-supported commands.
'c'	Command character. All printable ASCII characters are permitted.
<s><r><n>	Scale status indicator characters; ASCII letters or spaces
<m><f>	For details, see Chapter 6.4.1.
<r><e>	Scale diagnostics indicator characters; upper case ASCII letters or spaces.
<c><m>	For details, see Chapter 6.4.4.
<xxxxxx.xxx>	Weight data including minus sign (right-adjusted) and a decimal point (if any). If necessary, leading spaces are introduced with a leading zero before the decimal point. The entire field is always 10 characters long. With some error states, the field is filled up with minus signs '-'. Examples: <_ _ _ _ _0.000>; <_ _ _ _11.120>; <_ _ _ _ -1.000>; <- - - - - - - - - ->
<yyyyyy>	Text field of printable ASCII characters; for transporting scale information. The field has max. 25 characters.
<uuu>	Abbreviation of the used unit. The field is always 3 characters long; it is left-adjusted and filled up with spaces.

6.3 SMA Command Set

The SMA command set is intended for requesting weight values and status information as well as for control of the scale. The commands start with <LF> and end with <CR>.
Format: <LF>c<CR>

6.3.1 Requesting a Weight

6.3.1.1 Requesting a Weight

Command: <LF>W<CR>
Reply: The scale immediately returns the weight and status: gross weight if not tared, net weight if tared.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.1.2 Requesting the Weight with Stability

Command: <LF>P<CR>
Reply: The scale returns the weight and the status only, when the stability condition is met: Gross weight if not tared, net weight if tared.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.13.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
After elapse of the waiting time without reaching stability, the following reply is sent:
<LF><_><1><n><_><f><---------><___><CR>
For details, see Chapter 6.4.1 .

6.3.1.3 Requesting Weight Continuously

This is a command which generates non-requested replies, because it does not function according to the strict pattern of command and reply. After the command, the scale repeats the reply continuously.

Command: <LF>R<CR>
Reply: The scale repeats the weight and status information continuously until another command is received.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

Dependent on the used baud rate, the repetition rate of reply telegrams is roughly as follows:
19200 bd ⇨ 100ms
9600 bd ⇨ 110ms
4800 bd ⇨ 170ms

6.3.1.4 Requesting the High-Resolution Weight

Command: <LF>R<CR>
Reply: The scale immediately returns the high-resolution (10x) weight and status: Gross weight if not tared, net weight if tared.
Note: The <n> gross/net status is shown in lower-case letters while the high-resolution weight is sent.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.1.5 Requesting the High-Resolution Weight with Stability

Command: <LF>Q<CR>
Reply: The scale returns the weight and the status only, when the stability condition is met: Gross weight if not tared, net weight if tared.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.13.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
After elapse of the waiting time without reaching stability, the following reply is sent:
<LF><_><1><n><_><f><---------><___><CR>
For details, see Chapter 6.4.1 .

6.3.1.6 Requesting the High-Resolution Weight Continuously

This is a command which generates non-requested replies, because it does not function according to the strict pattern of command and reply. After the command, the scale repeats the reply continuously.

Command: <LF>S<CR>
Reply: The scale repeats the weight and status information continuously until another command is received.
<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

Dependent on the used baud rate, the repetition rate of reply telegrams is roughly as follows:
19200 bd ⇨ 100ms
9600 bd ⇨ 110ms
4800 bd ⇨ 170ms

6.3.1.7 Requesting the Tare Weight

Command: <LF>M<CR>
Reply: The scale returns the tare weight and signals the 'tared' status in the <n> status character.
<LF><s><r><T><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.2 Controlling the Scale

6.3.2.1 Request for Taring of the Scale

Command: <LF>T<CR>
Reply: The scale makes a taring attempt and signals the tared status in the <s> and <n> characters.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.13.
<LF><s><r><N><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.2.2 Request for Taring with Fixtare Value

Command: <LF>T<xxxxxx.xxx><CR>
Reply: The scale makes a taring attempt using the fixtare value <xxxxxx.xxx> and signals the tared status in the <s> and <n> characters.
<LF><s><r><N><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.2.3 Request for Zero Setting of the Scale

Command: <LF>Z<CR>
Reply: The scale makes a zero setting attempt and signals the zero status in the <s> character.
For this function, the stability condition must be met. The maximum waiting time for stability is set under [Tare timeout]; see Chapter 5.4.13.
<LF><Z><r><n><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .
Unless the scale is in the zero setting range, an error reply is generated.

6.3.2.4 Request for Tare Resetting

Command: <LF>C<CR>
Reply: The scale deletes the tare weight and signals the tare reset status in the <n> status character.
The scale tare is reset.
<LF><s><r><G><m><f><xxxxxx.xxx><uuu><CR>
For details, see Chapter 6.4.1 .

6.3.3 Scale Diagnosis

Command: <LF>D<CR>
Reply: The scale starts the diagnosis and returns a diagnosis reply.
<LF><r><e><c><m><CR>
For details, see Chapter 6.4.1 .

6.3.4 Scale Data

6.3.4.1 Scale Data – First Line

Comman d: <LF>A<CR>
Reply: The scale sends the first line of its scale data.
<LF><SMA>:<yyyyyy><CR>
For details, see Chapter 6.4.1 .

6.3.4.2 Scale Data – Other Lines

Command: <LF>B<CR>
Reply: The scale sends additional lines of its scale data.
<LF><MFG>:<yyyyyy><CR>
For details, see Chapter 6.4.1 .

6.3.5 Scale Information

6.3.5.1 Scale Information - First Line

Command: <LF>I<CR>
Reply: The scale sends the first line of its scale information.
<LF><SMA>:<yyyyyy><CR>
For details, see Chapter 6.4.1 .

6.3.5.2 Scale Information – Other Lines

Command: <LF>N<CR>
Reply: The scale sends additional lines of its scale information.
<LF><TYP>:<yyyyyy><CR>
For details, see Chapter 6.4.1 .

6.3.6 Escape Command

Command: <ESC>
Reply: This is the only command which does not work according to the <LF>c<CR> protocol principle. It does not have a reply. The <ESC> character is detected at any time and cancels any current command.

6.4 SMA Reply Messages

In this section, the replies are described in detail. The data format of each reply has a fixed length. The communication error is the only exception from this pre-definable format. Thus the controlling computer can check each reply according to fixed rules, because each data field is in a fixed position.

6.4.1 Standard Reply

With most commands, the reply format is as described below:
Exceptions are the commands: 'D', 'A'/'B' and 'I'/'N'.

<LF> <s> <r> <n> <m> <f> <xxxxxx.xxx> <uuu> <CR>

Reply format and meaning:

<LF>		Start of reply message
<s>	Scale status	Definition / example
	'Z'	Zero within 1/4d <xxxxxx.xxx>= 0.000
	'O'	Above Max <xxxxxx.xxx>= +weight
	'U'	Below zero <xxxxxx.xxx>= - weight
	'E'	Zero setting error
	'T'	Taring error
	<space>	None of the above conditions Note: For 'E', 'I', 'T' error conditions <xxxxxx.xxx>= ––––– (minus sign) and 'Z', 'O', 'U' are overwritten.
<r>	Range	('1', '2', '3', etc.) always '1' for single range scales
<n>	Gross/net	Status
	'G'	Gross weight
	'T'	Tare weight (as reply from 'M' command)
	'N'	Net weight
	'g'	High-resolution gross weight
	'n'	High-resolution net weight
<m>	Stability status	
	'M'	The scale is not stable
	<space>	The stability-of-scale condition is met
<f>	Reserved for future extensions	
<xxxxxx.xxx>	Weight value; the field has always 10 characters	
<uuu>	Unit of the weight value	
<CR>	End of the reply message	

Example:

Command	Reply
<LF>W<CR>	<LF> <_> <1> <G> <_> <_> <_ _ _ _ 5.025> <lb_> <CR>
<LF>W<CR>	<LF> <_> <1> <N> <_> <_> <_ _ _ _ 100000> <lb_> <CR>
<LF>H<CR>	<LF> <_> <1> <g> <_> <_> <_ _ _ _5.0025> <lb_> <CR>
<LF>Z<CR>	<LF> <Z> <1> <G> <_> <_> <_ _ _ _ _0.000> <lb_> <CR>
<LF>R<CR>	<LF> <_> <1> <G> <_> <_> <_ _ _ _ 7.025> <kg_> <CR> <LF> <_> <1> <G> <M> <_> <_ _ _ _ 7.650> <kg_> <CR> ... repeat... <LF> <_> <1> <G> <_> <_> <_ _ _ _ 7.650> <kg_> <CR> The scale repeats the weight, until another command is received.

6.4.2 Reply with Unknown Command

<LF> ? <CR> A command from the controlling computer that is not implemented, or invalid, is replied with an ASCII '?'.

6.4.3 Reply in Case of Communication Error

<LF> ! <CR> A command from the controlling computer that is unknown to the scale due to a communication error is replied with an ASCII '!'. This includes parity error or frame error (if any).

6.4.4 Reply with Diagnosis Command

When a diagnosis command is given, the scale makes a test and gives a status reply.
<LF> <r> <e> <c> <m> <CR>
Reply format and meaning:

<LF>	Start of diagnosis reply
<r>	'R' = RAM or ROM error, '_' = OK,
<e>	'E' = EEPROM error, '_' = OK
<c>	'C' = calibration error, '_' = OK
<m>	Always: '_' = OK
<CR>	Start of the diagnosis reply

Example: without error status

Command	Reply
<LF>D<CR>	<LF> <_> <_> <_> <_> <CR>

6.4.5 Reply with 'A' and 'B' Command

Reply format with 'A' and 'B' commands (variable length):
<LF><xxx>:<yyyyyy><CR>
The reply format and meaning are:

<LF>	Start of reply from 'A'/'B' command
<xxx>	The field name is three characters long, left-adjusted and filled up with spaces on the right, if necessary. The following fields are sent: "SMA" level/revision (reply from 'A' command) "MFG" manufacturer marking (reply from the 1st 'B' command) "MOD" product / model identification (reply from the 2nd 'B' command) "REV" software version (reply from the 3rd 'B' command) "SN_" serial number (reply from the 4th 'B' command) "END": This is always the last inscription field (reply from the last 'B' command)
':'	Separator between field name and field content.
<yyyyyy>	The data field has up to 25 characters. The SMA field contains <level/revision> with the following meaning: level= (1, 2, etc.); revision= (1.0, 1.1, etc.)
<CR>	End of reply from 'A'/'B' command

Example:

Command	Reply
<LF> A <CR>	<LF>SMA:1/1.0 <CR>
<LF> B <CR>	<LF>MFG:Sartorius <CR>
<LF> B <CR>	<LF>MOD:PR5220 <CR>
<LF> B <CR>	<LF>REV:01.01.9 <CR>
<LF> B <CR>	<LF>SN_:148388723 <CR>
<LF> B <CR>	<LF>END: <CR>

Note: If the controlling computer sends another 'B' command:
<LF> B <CR> <LF> ? <CR>

6.4.6 Scale Reply with 'I' and 'N' Commands

Reply format with and 'N' commands (variable length):
<LF><xxx>:<yyyyyy><CR>
Reply format and meaning:

<LF> Start of reply from 'I'/'N' command

<xxx> The field name is three characters long, left-adjusted and filled up with spaces, if necessary.
The following fields are sent:

"SMA" level/revision
(reply from 'I' command)

"TYP" Scale type: 'S'= scale
(reply from the 1st 'N' command)

"CAP" Max, unit, scale interval and decimal position, separated by ':'
Meaning
:
yyyyyy= uuu:c..c:n:d
uuu= unit
n= scale interval (e.g. 1, 2, 5,10,20...) without decimal point
d= decimal point position
'0'= without, '1'= xxxx.x, '2'= xxx.xx, '3'= xx.xxx , ... etc.
(reply from the 2nd 'N' command)

"CMD" Supported SMA commands
(reply from the 3rd 'N' command)

"END" This is always the last inscription field
(reply from the last 'N' command)

':' Separator between field name and field content.

<yyyyyy> The data field has up to 25 characters.
The SMA field contains <level/revision>
Meaning: level= (1, 2, etc.); revision= (1.0, 1.1, etc.)

<CR> Start of reply from 'I'/'N' command

Example: 6000kg x 1kg platform scale

Command	Reply
<LF> I <CR>	<LF>SMA:2/1.0 <CR>
<LF>N<CR>	<LF>TYP:S <CR>
<LF>N<CR>	<LF>CAP:kg_:6000:1:0 <CR>
<LF>N<CR>	<LF>CMD:HPTMCR <CR>
<LF>N<CR>	<LF>END: <CR>

Example: 5000g x 1g, 10000g x 2, 25000g x 5 multiple range / multi-interval

Command	Reply
<LF> I <CR>	<LF>SMA:2/1.0 <CR>
<LF>N<CR>	<LF>TYP:S <CR>
<LF>N<CR>	<LF>CAP:g_:5000:1:0 <CR>
	<LF>CAP:g_:10000:2:0 <CR>
	<LF>CAP:g_:25000:5:0 <CR>
<LF>N<CR>	<LF>CMD:HPTMCRQ <CR>
<LF>N<CR>	<LF>END: <CR>

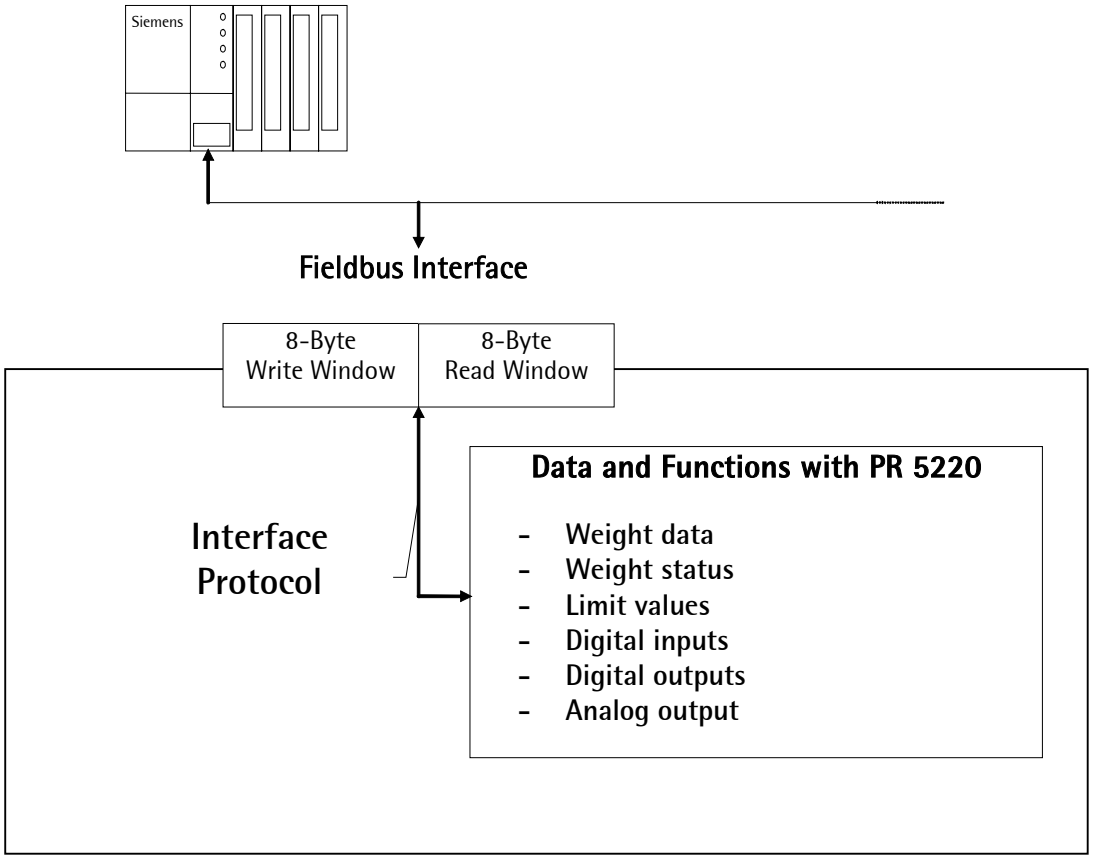
6.5 Communication Error

When a communication error due to a parity error or a frame error (if used) was detected, the scale sends an ASCII '!' character. The only other error is the detection of an unknown or non-supported command. In this case, an ASCII '?' character is sent as a reply. Dependent on the error messages, the controlling computer must decide how to continue the scale operation.

7 Fieldbus Interface

7.1 Fieldbus Interface Protocol

The interface works with an 8-byte write window and an 8-byte read window. The fieldbus exchanges its data cyclically with each slave. This means: In each cycle, 8 bytes are written and 8 bytes are read, also if the data content is unchanged.
The fieldbus protocol ensures the data transport between the fieldbus master and the 2 x 8-byte data windows.
The interface protocol runs under the fieldbus and manages the access to a multitude of different data.



7.1.1 Write Window (Input Area)

Data transmission from the master to the slave (PR 5220) is in this window.

The first four bytes are used only for writing a data value.
The register number is in byte 5.

Bytes 6 and 7 contain bits in direct access independent of the write data.
The command is executed after a 0-1 transition of the corresponding bit.

Byte 0	Write data: MSB
Byte 1	"
Byte 2	"
Byte 3	Write data: LSB
Byte 4	Read_Value _Select
Byte 5	Write_Value _Select
Byte 6	Direct control bits
Byte 7	Direct control bits

7.1.2 Read Window (Output Area)

Data transmission from the slave (PR 5220) to the master is in this window.
The first four bytes are used for reading a data value.

The register number of data is mirrored in byte 4 by the write window, when data is available.

Bytes 5, 6 and 7 contain status bits independent of the read data.

Byte 0	Read data: MSB
Byte 1	"
Byte 2	"
Byte 3	Read data: LSB
Byte 4	Read_Value _Selected
Byte 5	General system bits: - Write_Active - power_fail - analog error...
Byte 6	Status bits
Byte 7	Status bits

7.1.3 Reading and Writing Data

The number of data exceeds the size of the read/write window by far. For this reason, data is addressed with Write_Value_Select and Read_Value_Select. To do this, the first six bytes of the write window and the first five bytes of the read window are required. These can be used by the master to write data in PR 5220: e.g., a limit value is set to 100kg. The master can also read out weight values or other data from the PR 5220. For this purpose, the write and the read window are always required. Safe data exchange is ensured by a write and a read procedure.
For reading status bits, and for writing direct control bits, however, no procedure is required. The general system bits and the status bits are always provided and need not be requested. The direct control bits are also available continuously.

Procedure for reading data:
1. Writing the register number as Read_Value _Select in byte 4 of the **write window** (e.g. net weight).
2. Waiting, until the Read_Value _Selected in byte 4 of the **read window** is equal to the Read_Value _Select in byte 4 of the write window.
3. Now the value is available in bytes 0 to 3.

Procedure for writing data:
1. Waiting, until Write_Active = 0 in the **read window** (ready to receive new data).
2. Writing the value in bytes 0 to 3.
3. Writing the register number in byte 5 (Write_Value_Select).
4. Waiting, until Write_Active = 1 (acknowledges data reception)
5. Writing 0 in byte 5 (Write_Value_Select) -> Write_Active goes to 0.

7.2 Description of the I/O Area (Read / Write Window)

7.2.1 Input Area

Data transmission from the master to the PR 5220 (slave) is via the input area.
Weight or data requests are transmitted to the slave by the master.
The master has write access; the slave has read access.

Byte	Name								Description
0	Write_Value (MSB)								e.g. limit value
1	:::								”
2	:::								”
3	Write_Value (LSB)								”
4	Read_Value_Select								e.g. gross weight
5	Write_Value_Select								Write: Limit 1 On
6	free	free	free	free	free	outp. 3	outp. 2	outp. 1	Free / digital outputs
7	Get FixTare	Set FixTare	Res Power	Res Test	Set Test	Res Tare	Set Tare	Set Zero	Control byte, response to 0->1 transition
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 3	Bit 1	Bit 0	

The control byte activates the corresponding action in the instrument with a set bit.
After execution of the operation, the bit should be reset.

Variable	Function
Write_Value	The weight value is transmitted as a binary 32-bit value with plus or minus sign. Data type: DINT
Read_Value_Select	For selecting the value sent by the instrument
Write_Value_Select	For selecting the function to be executed by the instrument
GetFixTare	The gross weight is copied into the fixtare memory.
SetFixTare	Taring is performed using the value stored in the fixtare memory.
ResPower	The Power_Fail bit in the output area is deleted.
ResTest	The test operating mode is finished.
SetTest	The test operating mode is started. Now the test value can be read out by reading out the gross weight.
ResTare	Tare is reset.
SetTare	The instrument is tared.
SetZero	The instrument is set to zero.

7.2.2 Output Area

Data transmission from the PR 5220 to the master is via the output area.
The weight or data information requested by the master is transmitted to the master by PR 5220.
PR 5220 has write access, the master has read access.

Byte	Name								Description
0	Read_Value (MSB)								e.g. gross value
1	:::								”
2	:::								”
3	Read_Value (LSB)								”
4	Read_Value _Selected								e.g. gross
5	Write Active	Power Fail	Out 3	Out 2	Out 1	Limit 3	Limit 2	Limit 1	Status
6	Cmd Busy	Cmd Error	Inp.3	Inp.2	Inp.1	Tare Active	Cal Active	Test Active	Command status
7	Dimmed	Stand-still	Inside ZSR	Center zero	Below Zero	Over-load	Above Max	Adc Error	Device status
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 3	Bit 1	Bit 0	

Variable	Function
Read_Value	The weight value is transmitted as a binary 32-bit value with plus or minus sign. Data type: DINT
Read_Value_Selected	Acknowledgement of the transmitted value.
Write_Active	The function selected with Write_Value_Select is executed once. This bit is deleted, when Write_Value_Select is set to 0.
Power_Fail	Is set when switching on the instrument. Is reset by ResPower with transition from 0→1.
Cmd_Busy	The instrument is busy executing a command (e.g. the instrument has received a taring command and waits for stability).
Cmd_Error	The instrument has interrupted the execution of a command (e.g. StandStill could not be reached within the defined standstill time). The error number can be read at Lasterror. It is set only, if an action is executed.
Tare_Active	The instrument was tared.
Cal_Active	The instrument is / was configured. When this bit is 1, the scale parameters (Expo/Unit/Step) must be read again. Set after power On and reset after reading the Max. capacity.
Test_Active	The instrument executes the ADC test. The read weight value is not the gross value, but the test value.
Dimmed	Above Max. capacity or below zero
Standstill	The instrument is stable.
InsideZSR	The weight value is within the zero setting range.
CenterZero	The weight value is within center zero (0 +/- 0.25 d)
BelowZero	The weight value is negative (gross< -0.25d)
Overload	The weight value has exceeded the Max. capacity, but is still within Max + permissible overload (gross <= max. capacity+overload)
AboveMax	The weight value has exceeded the Max. capacity, but is still within Max + permissible overload (gross <= max. capacity+overload)
AdcError	A/D conversion error. (Details are given in register 1, Read_Value_Select = 1)

7.2.3 Reading and Writing Register via Fieldbus

7.2.3.1 Reading Data: Read_Value, Read_Value_Select, Read_Value_Selected

When the master has to read from the instrument, the register number is transmitted in Read_Value_Select in the input area. The result is specified with Read_Value_Selected in the output area.

Action of the master	Response of PR 5220
Writing register no. in Read_Value_Select	
	Writing the selected register in Read_Value
	Copying Read_Value_Select into Read_Value_Selected
Waiting, until Read_Value_Selected = Read_Value_Select	
Reading Read_Value	

7.2.3.2 Writing Data: Write_Value, Write_Value_Select, Write_Active

When the master has to write into the instrument, the required action is transmitted into the input area with Write_Value_Select together with the data. Execution is indicated by bit Write_Active in the output area.

Action of the master	Response of PR 5220
Writing value in Write_Value	
Writing the register number in Write_Value_Select	
	Writing Write_Value in the selected register
	Setting bit Write_Active
Waiting, until Write_Active was set	
Writing 0 in Write_Value_Select	
	Resetting bit Write_Active

7.2.3.3 Setting Bit: Action_Select, Write_Active

Single bits can be set or reset directly with Write_Value_Select.
For setting, the bit number (80.. 127) is written in Write_Value_Select.
For resetting, the bit number + 128 (208..255) is written in Write_Value_Select.

Action of the master	Response of PR 5220
Writing the register number in Write_Value_Select	
	Writing Write_Value in the selected register
	Setting bit Write_Active
Waiting, until Write_Active was set	
Writing 0 in Write_Value_Select	
	Resetting bit Write_Active

7.2.3.4 Reading Bit

Single bits can be read only by reading a register. The procedure is described in Chapter 0.

7.2.3.5 Control Byte

Some instrument functions can be executed by setting bits in the input area directly.

Action of the master	Response of PR 5220
Setting bits in the control byte	
	The operation is handled
Resetting bits in the control byte	

7.2.3.6 Waiting for the Result of the Action

When an action taking a longer time was started, the end of execution can be waited for after starting (see Chapter 7.2.3.3 and Chapter 7.2.3.5).

Action of the master	Response of PR 5220
Setting bits as in Chapters 7.2.3.3 or 7.2.3.5	
	Acknowledging the set bit as in Chapter 7.2.3.3
	Setting the CmdBusy bit
	The operation is handled
	In the event of an error: Setting the CmdError bit and the LastError byte
	Resetting the CmdBusy bit
Waiting, until CmdBusy was reset	
Checking the CmdError bit	
When set, reading LastError (see Chapter 0)	

This is applicable to taring, zero setting etc. over the fieldbus.

7.2.4 Example: Reading the Gross Weight

The master writes value 8 in Read_Value_Select (byte 4) of the input area.

Input area

Byte	Value	Description
0		
1		
2		
3		
4	**8**	Gross
5		
6		
7		

The master waits, until value 8 was reflected in Read_Value_Selected (byte 4) of the output area.

Output Area

Byte	Value								Description
0	**00**								Gross value
1	**00**								”
2	**4**								”
3	**D2**								”
4	**8**								Gross weight request was detected
5									Status
6								**Test active**	Command status
7		Stand-still	Inside ZSR	Center zero	Below zero	**Over-load**	Above Max	**Adc error**	Device status
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 3	Bit 1	Bit 0	

The gross value (hex:000004D2 <=> 1234) can be read from bytes 0...3. When the 'Overload', 'Test Active' or 'ADC error' bits are set, the read value is invalid.
Negative values are output in two’s complement.

7.3 Feldbus Register

7.3.1 Register 0: I/O Status Bits for Reading

Dynamic status, only reading is permitted

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0						Input 3	Input 2	Input 1
Byte 1						Output 3	Output 2	Output 1
Byte 2						Limit 3	Limit 2	Limit 1
Byte 3								

7.3.2 Register 1: Scale Status

Dynamic status, only reading is permitted

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	DIM	STND	INZSR	CZERO	BELOW0	OVL	>Max	ADCERR
Byte 1					E6	E1	E3	E7
Byte 2						PowerFail	ActionActive	CmdError
Byte 3						TareActive	CalChanged	TestActive

Byte 0 corresponds to byte 7 in the output area; for weight error, see also the table in Chapter 5.5.1.

ADCERR — Error of analog conversion/ load cell circuit (OR function of the E1,E3,E7 bits)

>Max — Gross value is higher than Max (maximum capacity); the full scale deflection was exceeded.

OVL — Scale overload; Gross > Max + overload, `Error 2`

BELOW0 — Gross weight is negative (< 0-1/4 d)

CZERO — Center of zero; weight within 0 +/- 1/4 d

INZSR — The gross weight is within the zero setting range

STND — The scale is stable

DIM — The gross weight has exceeded the full scale deflection (0-1/4 d > weight value > Max+overload), (OR function of bits BELOW0, OVL).

E7 — The input signal is negative (inverse conversion), `Error 7`

E6 — No sense voltage, or Sense voltage is low, `Error 6`

E3 — The input signal is > 36mV (no end of conversion), `Error 3`

E1 — Arithmetic error (overflow), `Error 1`

CmdError — Error during execution (cmdError); e.g. the 'taring' operation is not handled, because the scale is not stable. The error is stored in LastError (register 4). The bit is reset with the ResetError bit (register 2).

ActionActive — The operation is handled; handling is busy

PowerFail — Power failure; is always set after power on. The PowerFail bit is reset with the ResetPWF bit (register 2) 'Reset power failure'.

TestActive — The analog test is busy

TareActive — The instrument was tared.

7.3.3 Register 2: State of State-Controlled Action Bits

Only reading is permitted; the signal state is shown.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0								
Byte 1								
Byte 2	87: GetFixTare	86: SetFixTare	85: ResetPWF	84: ResetTest	83: SetTest	82: ResetTare	81: SetTare	80: SetZero
Byte 3							89: ResetError	88: Print

7.3.4 Register 3: State of Edge-Controlled Action Bits

Only reading is permitted; it is always 0.

7.3.5 Register 4: Calibration Information, Error Byte

Only reading is permitted.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	EXPO							
Byte 1	UNIT							
Byte 2	STEP							
Byte 3	LASTERROR							

EXPO — One byte for the position of the decimal point; content in decimal form 0 ... 255
0 = 000000
1 = 00000.0
2 = 0000.00
3 = 000.000
4 = 00.0000
5 = 0.00000

UNIT — One byte for the weight unit; content in decimal form: 0 ... 255
2 = g, grams 3 = kg, kilograms
4 = t, tons 5 = lb, pound

STEP — One byte for scale interval; content in decimal form: 0 ...255
1 = scale interval '1', 2 = scale interval '2', 5 = scale interval '5'
10 = scale interval '10', 20 = scale interval '20', 50 = scale interval '50'

LASTERROR — Last error byte; see also CmdError bit, number of 'last error':
31 = no stability was reached (e.g. when taring)
33 = negative weight value when taring and 'legal-for-trade' mode on
47 = no zero setting; weight not within zero setting range
107 = no stability with Getfixtare

7.3.6 Register 5: Device Type and Software Release

Only reading is permitted.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	TYPE MSB							
Byte 1	TYPE LSB							
Byte 2	MAINVERSION							
Byte 3	SUBVERSION							

E.g. 5220 Rel 1.23 = 52200123_{hex}

7.3.7 Register 6: Board Number

Only reading is permitted.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Board number MSB							
Byte 1	""							
Byte 2	""							
Byte 3	Board number LSB							

E.g. 148388723 = $08D83B73_{hex}$

7.3.8 Register 7: (Reserved)

7.3.9 Register 8 ...15: Weight Data

Only reading is permitted.
The gross, net and tare weight are stored as DINT fixpoint.
The real data value is derived from DINT and EXPO as follows :

$$Value_{Real}=reading_{DINT}*10^{(-EXPO}$$

Register 8	Current gross value
Register 9	Current net value, if tared; otherwise gross
Register10	Current tare value, if tared, otherwise 0
Register11	Value on the front-panel display
Register12	Reserved
Register13	Reserved
Register14	Max (FSD)
Register15	Reserved (free)

7.3.10 Register 22 ... 27: Limit Values (Read/Write)

Register 22	Limit 1 on
Register 23	Limit 1 off
Register 24	Limit 2 on
Register 25	Limit 2 off
Register 26	Limit 3 on
Register 27	Limit 3 off

7.3.11 Register 30, 31: Fixed Values (Read/Write)

Register 30	Fixed value for analog output; value (num) 0... 20000 corresponds to 20mA
Register 31	Fixed value for fixtare; see also SetFixTare, GetFixTare (see Chapter 7.3.3)

7.3.12 Register 80 ... 89: State-Controlled Action Bits (Write)

For setting bits, see Chapter 7.2.3.3.
Only setting and resetting of single bits is possible.
When changing a bit from 0 to 1, the corresponding action starts. After handling the command, the bit must be reset. Application: the master writes cyclically.
The bit is set as Write_Value_Select with the specified number (see Chapter 7.2.3.3); the bit is reset at the specified number +128.

Register 80	SetZero	Set the gross weight to zero
Register 81	SetTare	Execute taring
Register 82	ResetTare	Reset tare
Register 83	SetTest	Start the ADC test
Register 84	ResetTest	Finish the ADC test
Register 85	ResetPwf	Reset the PowerFail bit (Register 1; the bit was set after power on)
Register 86	SetFixTare	Taring with weight in numerical address D31 'Fixtare'
Register 87	GetFixTare	The current gross weight is copied into numerical address D31.
Register 89	ResetError	The CmdError error bit is reset

7.3.12.1 Register 112 ... 121: Transition-Controlled Action Bits (Write)

For setting bits, see Chapter 7.2.3.3.
As soon as the bit was set, it is reset internally and the operation is handled; this is transition-controlled (for writing once).
The bit is set as Write_Value_Select with the specified number (see Chapter 7.2.3.3).

Register 112	SetZero
Register 113	SetTare
Register 114	ResetTare
Register 115	SetTest
Register 116	ResetTest
Register 117	ResetPwf
Register 118	SetFixTare
Register 119	GetFixTare
Register 121	ResetError

8 Global SPM Variables

For communication via OPC, the following variables are available:

BOOL	R	Digital input 1	X 0
BOOL	R	Digital input 2	X 1
BOOL	R	Digital input 3	X 2
BOOL	W	Digital output 1, transparent mode	X 8
BOOL	W	Digital output 2, transparent mode	X 9
BOOL	W	Digital output 3, transparent mode	X 10
BOOL	R	Output Limit 1	X 16
BOOL	R	Output Limit 2	X 17
BOOL	R	Output Limit 3	X 18
BOOL	R	ADC error	X 32
BOOL	R	Above Max	X 33
BOOL	R	Overload, above (Max + plus the range that is still permissible)	X 34
BOOL	R	Below zero	X 35
BOOL	R	Zero +/- 1/4 d	X 36
BOOL	R	Within the zero setting range	X 37
BOOL	R	The weight is stable	X 38
BOOL	R	Below zero or above Max	X 39
BOOL	R	Load cell measuring signal negative	X 40
BOOL	R	Load cell measuring signal > 36 mV	X 41
BOOL	R	Internal arithmetic error; CAL data are perhaps faulty	X 42
BOOL	R	ADC error, overload	X 43
BOOL	R	Command error	X 48
BOOL	R	Command active	X 49
BOOL	R	Power fail signal	X 50
BOOL	R	ADC test active	X 56
BOOL	R	Calibration active	X 57
BOOL	R	Instrument is tared	X 58
BOOL	R/W	Read / write marker bit 1	X 64
BOOL	R/W	Read / write marker bit 2	X 65
BOOL	R/W	Read / write marker bit 3	X 66
BOOL	W	Switch to net weight	X 72
BOOL	W	Set the instrument to zero	X 112
BOOL	W	Set tare of the instrument	X 113
BOOL	W	Reset the tare of the instrument	X 114
BOOL	W	Start the ADC test	X 115
BOOL	W	Finish the ADC test	X 116
BOOL	W	Reset the power fail signal	X 117
BOOL	W	Set the fixtare value as tare	X 118
BOOL	W	Store the current gross weight in the fixtare memory (D31)	X 119
BOOL	W	Start printing	X 120
BOOL	W	Reset error	X 121

BYTE	R	Transmitter status	B 4
BYTE	R	ADC status	B 5
BYTE	R	Command status	B 6
DINT	R	Current gross weight	D 8
DINT	R	Current net weight	D 9
DINT	R	Current tare weight	D 10
DINT	R	Max weight (FSD)	D 14
DINT	W	Weight limit 1 on	D 24
DINT	W	Weight limit 1 off	D 25
DINT	W	Weight limit 2 on	D 26
DINT	W	Weight limit 2 off	D 27
DINT	W	Weight limit 3 on	D 28
DINT	W	Weight limit 3 off	D 29
UDINT	W	Analog output for 'transparent' mode	D 30
DINT	W	Write the value in the fixtare memory	D 31

9 Configuration Print-Out

```
Configuration of PR5220
=======================================
Printed             :2006-11-17 17:24:47
Firmware (Beta)     : Rel. 00.25.02.2774
                          2006-11-15 08:15
Appl-DEFAULT        :          Rel. 00.90
                          2006-11-08 15:52
Bios (Beta)         : Rel. 00.25.02.1921
                          2006-11-13 12:10
Boardnumber         :           251390341


HW-Options
=======================================
Slot 1                              -empty-
Slot 2    PR5510/12               digital I/O
Slot 3      Builtin               digital I/O
Slot 4                              -empty-


Operating parameter
=======================================
AccessCode          :                     0
SetTareKey          :  tare & reset tare
SetZeroKey          :only when not tared


Limit's
=======================================
Limit 1 on
            Action :       -no action-
Limit 1 off         :                0 kg
            Action :       -no action-
Limit 2 on          :                0 kg
            Action :       -no action-
Limit 2 off         :                0 kg
            Action :       -no action-
Limit 3 on          :                0 kg
            Action       -no action-
Limit 3 off         :                0 kg
            Action :       -no action-



Digital I/O
=======================================
Output 1            :limit 1 out    X16=
Output 2            :limit 2 out    X17=
Output 3            :limit 3 out    X18=
Input 1 on          :set zero     X112=1
         Condition :no condition  -----
Input 1 off         :       -no action-
Input 2 on          :set zero     X113=1
         Condition :no condition  -----
Input 2 off         :       -no action-
Input 3 on          :reset tare   X114=1
         Condition :no condition  -----
Input 3 off         :       -no action-
```

```
Serial assignment
=======================================
Remote display      :          - none -
SMA                 :          - none -


Serial port Builtin RS232
=======================================
Protocol            :            XON/XOFF
Baudrate            :             9600 bd
Bits                :                   8
Parity              :                none
Stopbits            :                   1
Output mode         :                 raw


Network settings
=======================================
HW-address          :  00:90:6C:FB:E9:85
Hostname            :     PR5220-UDO-Mer
IP address          :           0.0.0.0
Subnet mask         :     255.255.240.0
Default gateway     :           0.0.0.0
VNC-Client          :   255.255.255.255


Calibration
=======================================
Max                 :            3000 kg
                                 3000 d
Scale interval                      1 kg
Deadload  at        :    +0.000000 mV/V
Max at              :    +1.000000 mV/V
Not calibrated
Sensitivity         :       833.33 cnt/d
                    :     4.000000 uV/d


Parameters
---------------------------------------
Measuretime         :            160 ms
Digital filter      :          aperiod.
Fcut                :            2.00 Hz
Test mode           :          Absolute
W & M               :                none
Standstill time     :            0.50 s
Standstill range    :            1.00 d
Tare timeout        :             2.5 s
Zeroset range       :           50.00 d
Zerotrack range     :            0.25 d
Zerotrack step      :            0.25 d
Zerotrack time      :             1.0 s
Overload            :                9 d
Min                 :               20 d
Range mode          :       Single range
```

10 Repairs and Maintenance

Repairs are subject to inspection and must be carried out at Sartorius. In case of defect or malfunction, please contact your local Sartorius dealer or service center for repair. When returning the instrument for repair, please include a precise and complete description of the problem. Maintenance work may be carried out only by a trained technician with expert knowledge of the hazards involved and the required precautions.

10.1 Solder Work

Soldering work on the instrument is neither required nor permitted.

10.2 Cleaning

⚠ Disconnect the instrument from the supply voltage and remove connected data cables.

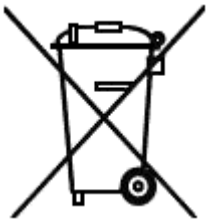
⚠ Prevent moisture from penetrating the instrument

⚠ Do not use aggressive cleaning agents (solvents, etc.).

⚠ Do not wash down the equipment with water or dry it with compressed air; this is not permitted.

11 Disposal

If you no longer need the packaging after successful installation of the equipment, you should discard it by the local facilities for waste disposal. The packaging is made of environmentally friendly materials and is a valuable source of secondary raw material.



Place discharged batteries in local collection boxes (not in the household waste). In Germany, corresponding collection boxes are made available by GRS (Stiftung Gemeinsames Rücknahmesystem Batterien) on request with Sartorius.
For scrapping of the instrument, please contact your local authorities. Prior to scrapping, any batteries should be removed. In Germany, Sartorius AG takes care of the return and legally compliant disposal of its equipment on its own.
In other countries, please consult with the local authorities.

12 Specifications

12.1 Instructions for Use of 'Free Software'

The firmware in the PR 5220 instrument contains free software that is licensed under
GNU General Public License (GPL) Version 2, June 1991, and
GNU Lesser General Public License (LGPL) Version 2.1, February 1999.
This software, developed by third parties, is protected by copyright and is supplied free of charge.

The license terms and conditions of Free Software Foundation, Inc in English are enclosed in the delivery of the instrument.

The source text written under the above conditions is contained on the CD-ROM delivered with the instrument.

12.2 General Data

The following characteristics are valid after a warm-up time of at least 60 minutes (reference temperature: 23°C).

12.2.1 Power Supply

Supply voltage		24 VDC	+/- 20 %
Power consumption		6 Watts	
Power consumption	with fieldbus option	8 Watts	

12.3 Effect of Ambient Conditions

12.3.1 Environmental Conditions

Temperature range		
Reference temperature		23 °C
Ambient temperature for operation	10,000 e	-10... +40 °C
	'not legal for trade'	-10... +50 °C
Power-on temperature		0... +50 °C
Storage/transport		-40... +70 °C
Humidity		< 95 %, no condensation, (acc. to IEC 68-2)
Protection type to DIN 40050		IP30

12.3.2 Electromagnetic Compatibility (EMC)

All data in compliance with EN 61326 industrial area

Housing	Radio frequency electromagnetic fields (80 – 1000 MHz)	EN 61000-4-3	10 V/m
	Radio frequency electromagnetic fields (1.4 – 2.0 GHz)	EN 61000-4-3	3 V/m
	Radio frequency electromagnetic fields (2.0 – 2.7 GHz)	EN 61000-4-3	1 V/m
	Electrostatic discharge (ESD)	EN 61000-4-2	6 / 8 kV
Signal and control lines	Fast transients (burst)	EN 61000-4-4	1 kV
	Peak voltages (surge) 1.2/50 µs	EN 61000-4-5	1 kV
	Conducted disturbances by radio frequency (0.15 – 80 MHz)	EN 61000-4-6	10 V
Mains input	Fast transients (burst)	EN 61000-4-4	2 kV
	Peak voltages (surge) 1.2/50 µs	EN 61000-4-5	1 / 2 kV
	Conducted disturbances by radio frequency (0.15 – 80 MHz)	EN 61000-4-6	10 V

12.3.3 RF Interference Suppression

Electromagnetic emission	In acc. with EN 61326, limit value class A, industrial area

12.4 Weighing Electronics

The weighing electronics are suitable for connection of strain-gauge load cells.

12.4.1 Load Cells

Load cell type	Strain gauge, 6 or 4-wire connection possible
Supply voltage	U= 12V DC for I_{max}= 160 mA for up to 8 load cells of 650 Ω each or 4 load cells of 350 Ω each
Sense voltage monitoring	Sense voltage below + 4VDC -- -4VDC is detected; can be switched off
Max. load	≥ 75 Ω
Cable length	Max. 500 m

12.4.2 Principle

Principle	DC voltage, delta-sigma converter, ratiometric to the load cell supply voltage
Conversion / measurement time	5, 10, 20, 40, 80, 160, 320, 640, 960, 1200, 1600 ms
Digital filter	Selectable, active 4th order (low-pass), Characteristic: Bessel, aperiodic, Butterworth, Tschebyscheff Configurable cut-off frequency

12.4.3 Accuracy and Stability

Accuracy class	≤ 10000 e (Cl. III) acc. to OIML R76 / EN 45501
Min. measuring signal (OIML)	0.5µV/e, i.e. 3 mV for 6000 e, 5 mV for 10000 e
Linearity error:	< 0.002 %
Zero stability error (TK_0)	< 0.02 µV/K RTI <= 0.004%/10K at 1mV/V
Span stability error (TK_{Spn})	< +/- 2 ppm/K

12.4.4 Sensitivity

Sensitivity	0.5 µV/e @ 10000e (Cl. III) OIML R76,
Resolution	7.5 million counts at 3mV/V, not legal for trade
Input voltage (input signal + dead load)	0 ... max. 36 mV DC, symmetrical to 0
Dead load range	36 mV DC (max. input signal); input/ calibration via software

12.5 Mechanical Data

12.5.1 Construction

Polyamide housing for mounting on top-hat rail, black, flammability class V0 (UL94).

12.5.2 Dimensions

Housing:	PR 5220/00	PR 5220/01, -/04
Width	45 mm	68 mm
Height	99 mm	99 mm
Depth	116 mm	116 mm

12.5.3 Weight

Net weight	PR 5220/00	PR 5220/01, -/04
	0.29 kg	0.35 kg

12.6 Use in Legal-for-Trade Mode

The Guide to Verification and further documents can be found on the Internet at www.sartorius-mechatronics.com

12.6.1 Documentation for Verification on the Enclosed CD

The enclosed CD has a directory containing the following PDF documents (in preparation):

- EC Declaration of Conformity to Council Directive 90/384/EEC
- Plates and markings (sealing and labels)
- Test certificate for the instrument
- EC type approval

12.6.2 Additional Instructions

Information on the meaning of the CAL switch to be sealed can be found in Chapter 5.1.1 .
Make sure when configuring the instrument (see Chapter 5.4.13) that the settings are in compliance with the legal requirements as well as with the requirements of the EC Type Approval and the EC Test Certificate. Furthermore, the settings and functions described under Item 7 of the EC Test Certificate (Orders and Conditions) must be checked. The person performing installation is responsible for selecting the legally permitted settings. The settings must be checked.

13 Index

A

Access code ... 49
Adapting the analog output ... 59
Analog output ... 58

B

Bus activity ... 25

C

Cal Modify ... 34
Cal New ... 34, 41
CAL switch ... 26, 27, 31
Calibration ... 39
Cleaning ... 92
Commissioning ... 26

D

Data, saving ... 26, 27, 28
Dead load ... 37
Dead load correction ... 41
Declaration of conformity ... 96
DeviceNet ... 50
DeviceNet interface ... 24
Display of calibration data ... 33
Disposal ... 92

E

EMC ... 8, 94
Error 1 2 3 6 7 ... 25
Error 1 3 6 7 ... 85
Error messages ... 46
Error messages on the weight display ... 46
Error messages, calibration ... 35, 36, 37
Error status ... 25
Execution message ... 14

F

Factory settings ... 26
Free software ... 93
Fuse ... 8

I

I/O status bits for reading ... 85
Increased resolution ... 33
Indicator LEDs ... 25
Info key ... 30
Informational text ... 14
Input area ... 80

L

LAN adaptor ... 16
LEDs ... 25
Legal-for-trade operation ... 45
Limit values ... 56

M

Max ... 35
Maximum capacity ... 35
Multi-interval scale ... 45
Multiple range scale ... 45

N

Navigation keys ... 13
Network parameters ... 51
Network port ... 16
Netzwerk ... 51

O

Operating concept ... 26

P

Power on ... 25
PR 1627 ... 19
PR 1628 ... 19
Processing ... 14
Profibus interface ... 23
Profibus-DP ... 50

Q

Question mark ... 14

R

Read window ... 79
Reading and writing register via fieldbus ... 82
Reset ... 27
RS-422 interface ... 19

S

Safety information ... 7
Scale interval ... 36
Scale status ... 85
Sense voltage ... 46
Serial port ... 47
SetTareKey ... 49
Setup menu ... 31
SMA protocol ... 69
smart calibration ... 40
Subsequent dead load correction ... 41
Supply voltage connection ... 8
System messages ... 14

T

Terminal ... 19
Test certificate ... 96

V

VNC ... 16

W

Warning 14
Weight error 25
Weight status indicator LED 25
Write window 79

Z

Zero setting 49
Zero-setting range 44
Zero-setting range, utilized 41

Sartorius Mechatronics T&H GmbH
Meiendorfer Straße 205
22145 Hamburg, Germany
Tel +49.40.67960.303
Fax: +49.40.67960.383
www.sartorius-mechatronics.com

© Sartorius Mechatronics T&H GmbH
All rights are strictly reserved
Printed in Germany